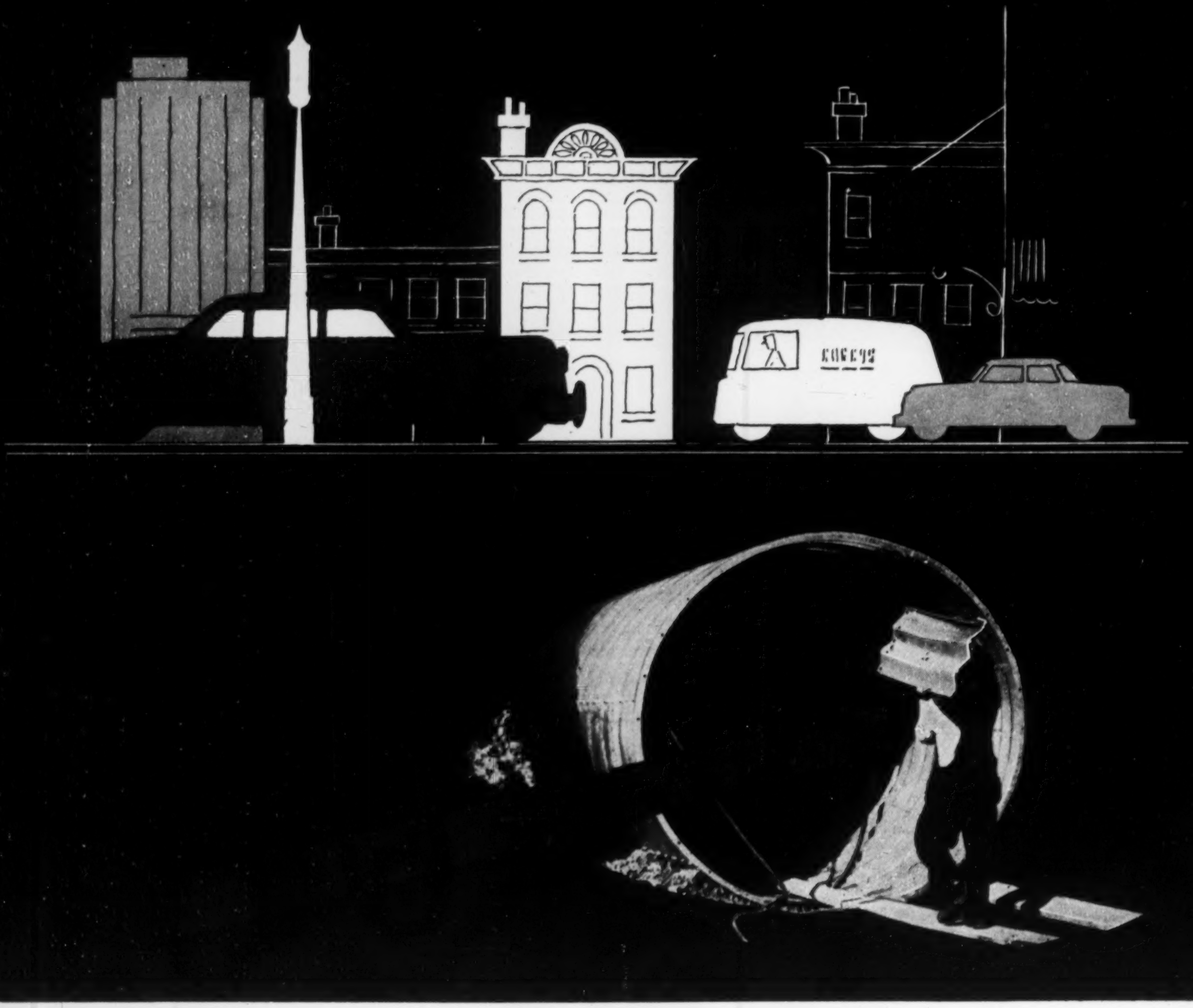
ENGINEERING NEWS-RECORD

OCTOBER 7, 1954

$6.00 A YEAR

1954 CONSTRUCTION and BUILDING COSTS

This Copy Belongs To—



They saved money going into a hole

It didn't seem right to tear up expensive surface installations, divert traffic and disrupt business when installing underground structures. Tunneling was the logical alternative, but old-time methods made it a laborious, time-consuming job. Armco engineers felt sure there must be a better, less expensive way.

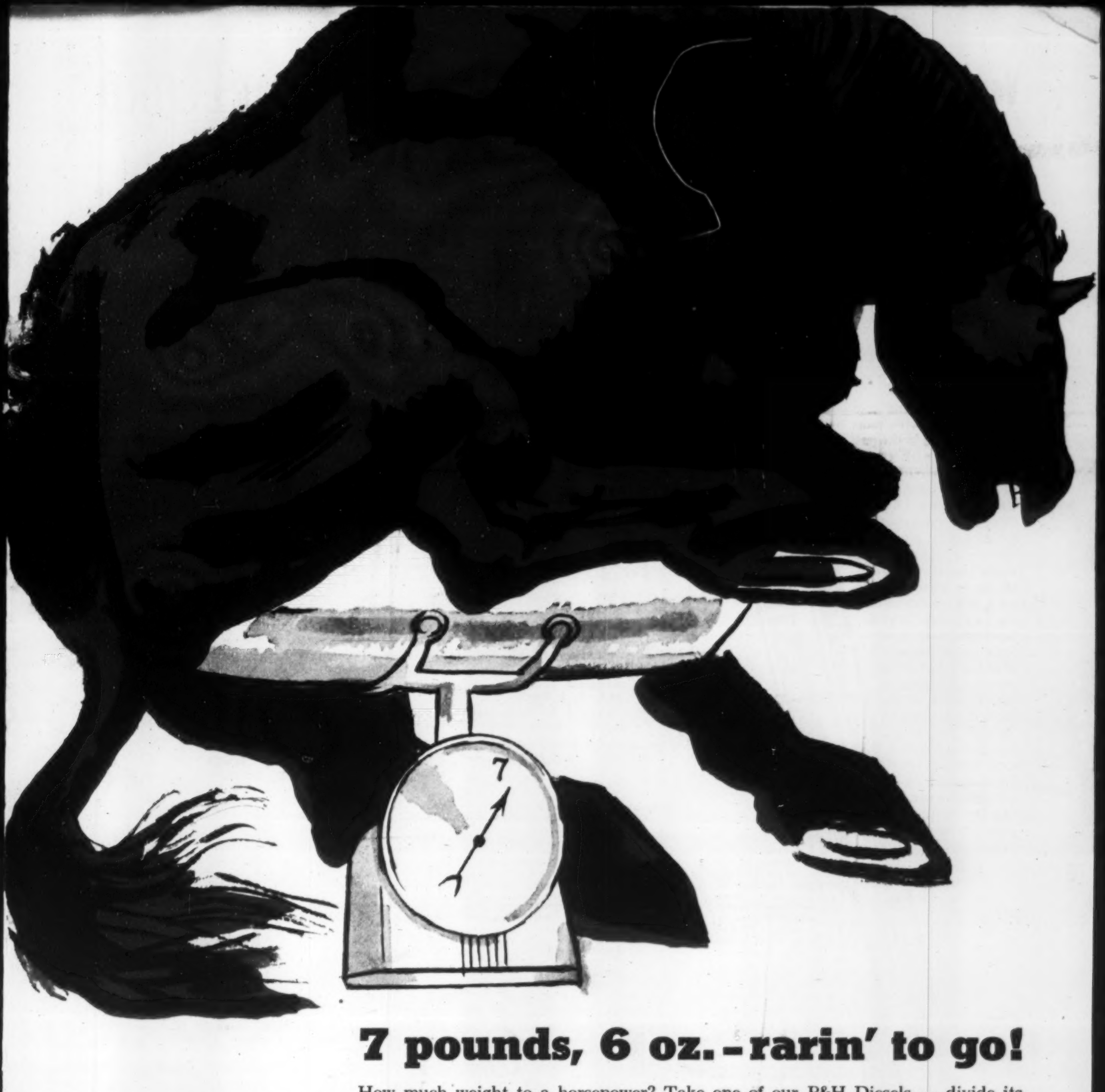
The result was Armco Tunnel Liner . . . a new type of plate having lapped joints and corrugated metal design to provide utmost strength with the least bulk and weight. Now one or two unskilled workman can carry, hold and bolt into place an Armco Liner Section. Only a structural wrench is needed. The tunnel is uniformly strong. Labor costs are low and the job goes fast. Less bulk means less excavation and storage requirements are smaller. You buy no excess metal.

Making products simpler and more efficient has been a prime goal at Armco for more than 40 years. So has the designing of products to meet specific needs. Today you can bring your drainage and construction problems to Armco with full assurance that you will receive all the benefits of long experience, extensive research facilities and a real interest in helping to solve them.

Armco has a complete range of engineered products and convenient, authoritative data to help you. If your problem is difficult or unusual why not talk it over with us.

ARMCO

ARMCO DRAINAGE & METAL PRODUCTS, INC.



7 pounds, 6 oz. - rarin' to go!

How much weight to a horsepower? Take one of our P&H Diesels — divide its weight by its power — and that's the figure you get.

The reason we're so proud of our baby: at 7 pounds, 6 ounces this horse is full grown! No competing diesel can produce a full horsepower to that amount of weight. Pound for pound, this engine out-powers them all.

Dollar for dollar, too. A P&H will give you more horsepower per dollar than any other diesel. And just as a sort of extra, it's also the easiest to service!

Not that it will need much servicing. Actually, a P&H Diesel takes less of it than the old gasoline engine. Its fuel cost: *about one-third.*

Some baby!

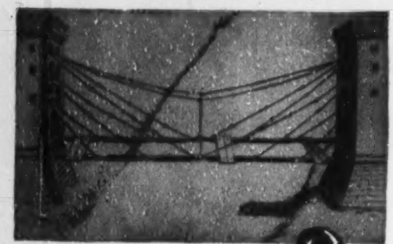
P&H Diesel Engine Division, Harnischfeger Corporation, Crystal Lake, Ill.

Horsepowers, 30 to 255. Two-cycle. 2, 3, 4, 6-cylinder models. Speeds to 1800 rpm. Stationary, mobile, marine. Diesel-generator sets

THE P&H DIESEL

lowest price per horsepower . . .
lowest weight per horsepower

Verantius' Pons Ferreus
A SUSPENSION BRIDGE DESIGN
early seventeenth century



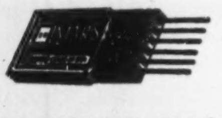
Engineering problems have been growing more and more complex in the past 300 years, and with them has grown the need for greater drafting precision. Since 1662, when the first Staedtler pencils were produced in Nurnberg, Germany, Staedtler has made constant improvements in pencil design and manufacture. Today, the Mars-Lumograph is America's finest imported drawing pencil; in the clutch pencil field the combination of the new 1001 Mars Technico push-button lead holder and 1904 Mars-Lumograph imported drawing leads insures your having the very best.

2H
2886
J.S. STAEDTLER, INC.
MARS
LUMOGRAPH
MADE IN GERMANY
2H
1001
J.S. STAEDTLER
MARS-LUMOGRAPH
<TECHNICO>

The 2886 Mars-Lumograph drawing pencil gives you precise thickness and the blackness of line needed for crisper, cleaner prints. Perfectly graded in 19 degrees; EXEXB to 9H. $1.50 per dozen—less in quantity.

The 1001 Technico Mars-Lumograph push-button lead holder costs no more than ordinary holders, has a noiseless, smooth-working, low-friction clutch mechanism, lightweight wood construction with perfect balance and, built into the push-button cap, a unique lead sharpener. $1.50 each—less in quantity.

1904 Mars-Lumograph Imported Drawing Leads are so opaque that inking-in is not necessary. Leads are ribbed for firm clutch grip and each has a removable cap which prevents sliding from holder. Available in 18 degrees; EXB to 9H. $1.20 per dozen—less in quantity.



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THAT VERSATILE RIG.. THE PULLSHOVEL!

Northwest Pullshovel digging bell holes along with the trench.

Originally built for trench excavation the Northwest Pullshovel, because of its easy control, accuracy of handling and digging power, has been found efficient on a dozen and one jobs. Digging bell holes and basements, trimming banks—even grading road have all been found in the day's work of the Pullshovel.

Versatility like this means money in your pocket and often saves time that would be otherwise eaten up by converting to another type of boom. Ask for details about the Pullshovel. There is a size for your job.

NORTHWEST
ENGINEERING COMPANY
1502 Field Building
135 South LaSalle Street
Chicago 3, Illinois

Handling pipe for a gas line.

Left: Grading road —an unusual Pullshovel operation.

Right: Trimming bank on a bridge approach.

Above: Another bank trimming job.

Left: More and more Pullshovels are being used for basement excavation.

Right: Cleaning out small ore pockets in mining work.

NORTHWEST

CRAWLER and TRUCK MOUNTED SHOVELS•CRANES•DRAGLINES•PULLSHOVELS

Has Your Shovel Stood the ROCK TEST

Rolling Steel Doors

Manually, Mechanically, or Electrically Operated

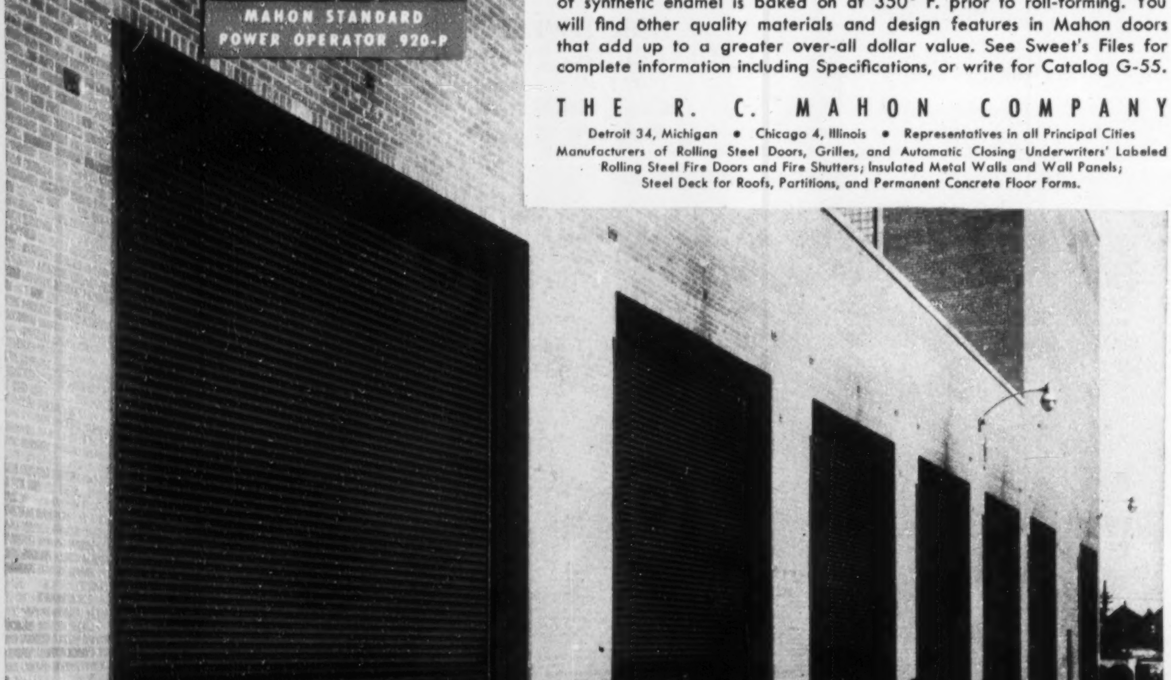
MAHON CHAIN-GEAR OPERATOR

MAHON STANDARD POWER OPERATOR 920-P

In the Diesel locomotive service shop, illustrated below, all track entrance openings are fitted with Mahon Power Operated Rolling Steel Doors. In this particular type of opening, and in thousands of other openings where door operating space is a critical factor, no other type of door so fully meets the requirements—because, Rolling Steel Doors in operation occupy no usable space inside or outside the opening . . . their vertical roll-up action permits use of floor space to within a few inches of the door curtain on both sides. And, there are no overhead tracks or other obstructions to interfere with crane handling adjacent to door openings. A Mahon electrically operated, quick-opening, quick-closing Rolling Steel Door will save valuable space and valuable time in any type of opening. In addition, Mahon Rolling Steel Doors are permanent—their all-metal construction assures a lifetime of trouble-free service and maximum protection against intrusion and fire. When you select a Rolling Steel Door, check specifications carefully . . . you will find extra-value features in Mahon doors—for instance, the galvanized steel material, from which the interlocking curtain slats are rolled, is chemically cleaned, phosphated, and treated with a chromic acid solution to provide paint bond, and the protective coating of synthetic enamel is baked on at 350° F. prior to roll-forming. You will find other quality materials and design features in Mahon doors that add up to a greater over-all dollar value. See Sweet's Files for complete information including Specifications, or write for Catalog G-55.

THE R. C. MAHON COMPANY

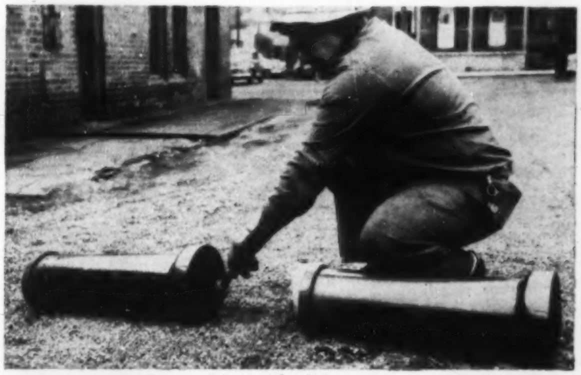
Detroit 34, Michigan • Chicago 4, Illinois • Representatives in all Principal Cities
Manufacturers of Rolling Steel Doors, Grilles, and Automatic Closing Underwriters' Labeled Rolling Steel Fire Doors and Fire Shutters; Insulated Metal Walls and Wall Panels; Steel Deck for Roofs, Partitions, and Permanent Concrete Floor Forms.



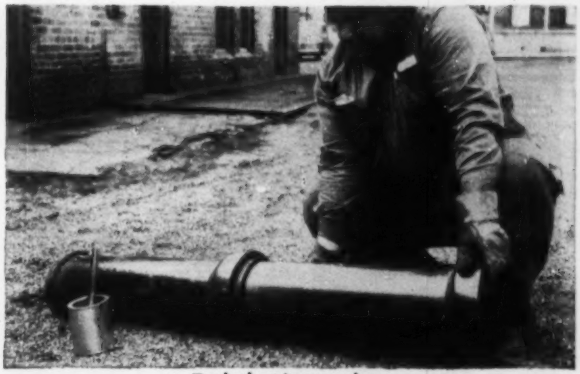
ROLLING STEEL DOORS, SHUTTERS AND GRILLES TO MEET EVERY REQUIREMENT

Seven of eight Mahon Power Operated Rolling Steel Doors installed in track openings of a Diesel locomotive service shop. In addition to these, five Mahon Automatic Underwriters' Labeled Rolling Steel Fire Doors are installed in openings of interior walls. Rock Island Lines, Archts. & Engrs., S. N. Nielsen Co., Gen. Contr

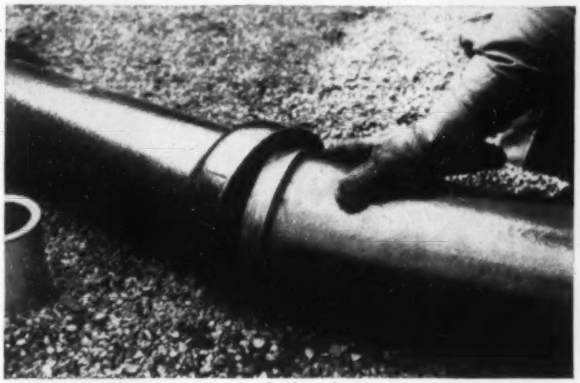
MAHON



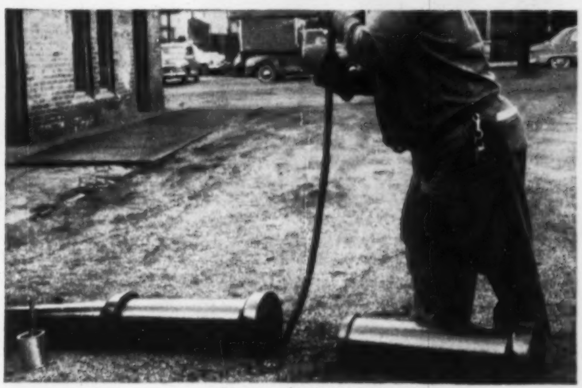
Grease joint with plain water.



Push the pipe together.



Line up bell and spigot.



Secure the joint.

The First Mechanical Clay Pipe Joint

LAY A 50-FOOT CLAY PIPE LINE IN FIFTEEN MINUTES

New **Amvit** *jointed clay pipe delivered ready to be installed*

NO special preparations are needed to lay a sewer line with Amvit Jointed vitrified clay pipe. The joint is "built-in", delivered on the pipe ready to be put in the ditch and "pushed together".

Laying the pipe is a simple operation, and gives you a line that is root proof and infiltration proof.

The Amvit Joint is made of a new acid resistant plastic material with rubber characteristics dielectrically cast on the 4″ through 8″ pipe. The joints will not be harmed by alkalies, most acids, industrial gases and any conditions of underground service.

Availability of Amvit Jointed pipe dependent upon quantities and delivery date required.

For more information, write or call American Vitrified Products Company, National City Bank Building, Cleveland, Ohio, or our office nearest you.

PLANTS ACROSS THE NATION . . . Brazil, Indiana • Chicago, Illinois • Cleveland, Ohio • Crawfordsville, Indiana • Detroit, Michigan • East Liverpool, Ohio • Fenton, Michigan • Grand Ledge, Michigan • Lisbon, Ohio • Los Angeles, California • Milwaukee, Wisconsin • South Bend, Indiana • Uhrichsville, Ohio.

SINCE 1900

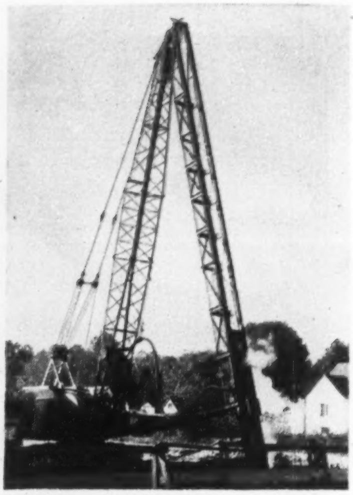
AMERICAN

American Vitrified Products Company

CLEVELAND, OHIO

Patent Pending

PENNSYLVANIA TURNPIKE

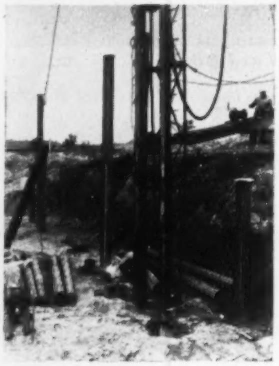


DELAWARE EXTENSION TO PENNSYLVANIA TURNPIKE

Monotube Piles FOR TURNPIKE AND THRUWAY CONSTRUCTION...WHERE SPEED AND ECONOMY COUNT

OHIO TURNPIKE

TURNER TURNPIKE, OKLAHOMA



NEW YORK THRUWAY

NEW JERSEY TURNPIKE

TAPERED and fluted Monotube piles—used in turnpike construction since the inception of such projects—offer *big* advantages that mean *big* savings.

Monotubes save time and money because of simplified on-the-job weld splicing, easy extendibility, quick cut-offs and minimum waste. Light mobile driving equipment is all that's required to drive lightweight Monotubes quickly and easily to any required depth.

Monotubes, cold-rolled for added strength, are recognized for their exceptional load bearing capacity. This, plus top-to-bottom visual inspection before concreting, means heavier loads with fewer piles. Also, with Monotubes there's a choice of gauge, taper, diameter or length . . . for varying soil conditions.

Before starting that next foundation job, find out how you can save with Monotube piles . . . without sacrificing strength or sound construction. Write today to The Union Metal Manufacturing Company, Canton 5, Ohio, for Catalog No. 81.

UNION METAL

Monotube Foundation Piles

the five M's of construction...

Men

Machines

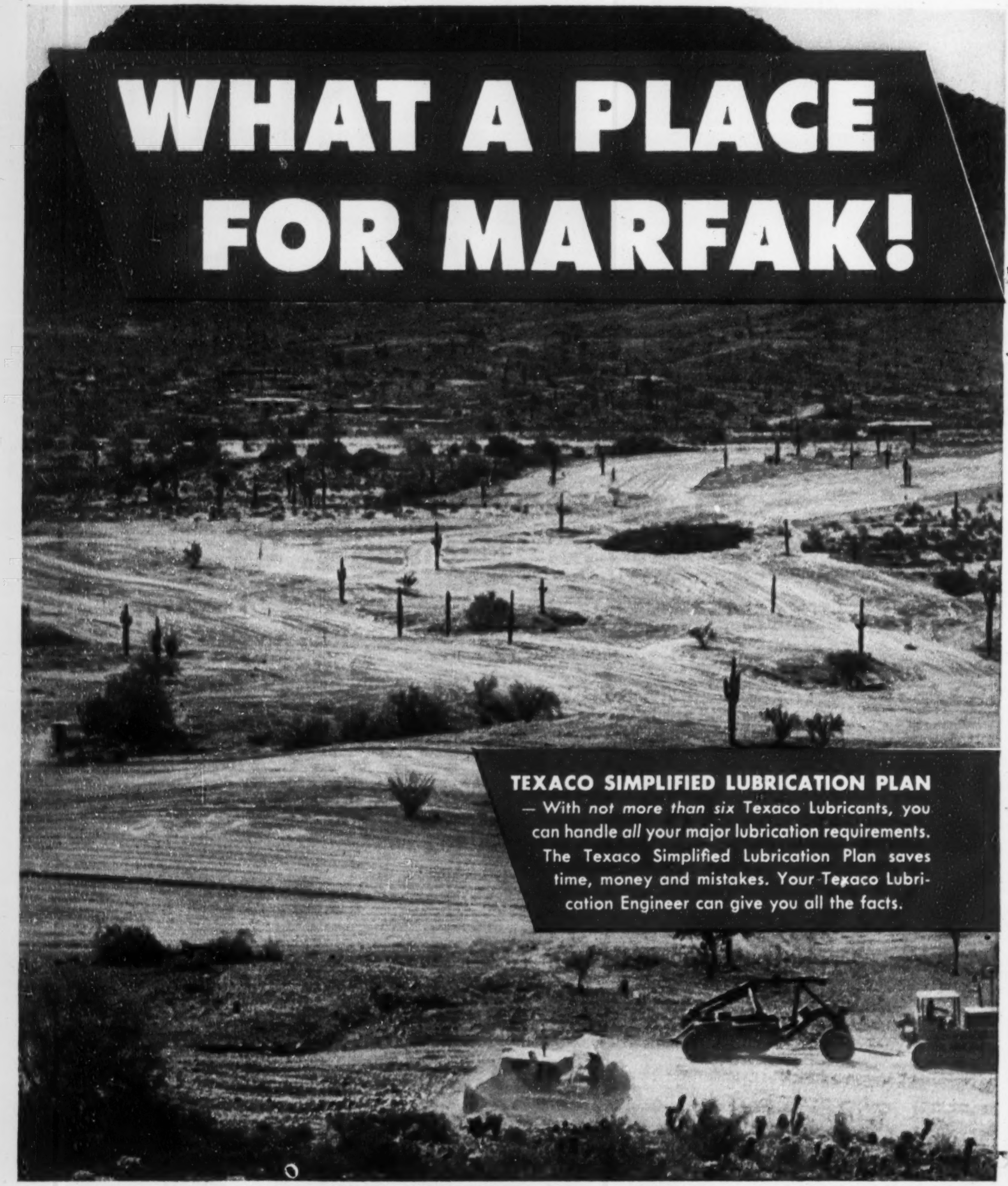
Materials

Methods

McGraw.

Plant Engineers: These essential elements, combined with McGraw Management, give you Quality Construction . . . Get the best . . . request . . . **F. H. McGRAW & COMPANY**
Engineers and Constructors
780 Windsor St., Hartford, Conn.

Write for new booklet "25 Years of Quality Construction"
Mailed free on request



TEXACO SIMPLIFIED LUBRICATION PLAN — With *not more than six* Texaco Lubricants, you can handle *all* your major lubrication requirements. The Texaco Simplified Lubrication Plan saves time, money and mistakes. Your Texaco Lubrication Engineer can give you all the facts.

TUNE IN:
TEXACO STAR THEATER
starring JIMMY DURANTE
or DONALD O'CONNOR
on television
... Saturday nights, NBC

TEXACO
T
REG. T. M.

TEXACO

CLOUDS of dirt and dust . . . rough terrain . . . what a place for *Texaco Marfak!* This rugged, world-famous chassis lubricant stays in the bearings, keeps dirt and moisture out, defies wear and prevents rust. *Texaco Marfak* gives you longer bearing life as well as considerably lower maintenance costs.

For wheel bearings, your most effective safeguard is *Texaco Marfak Heavy Duty.* Its tough, tenacious lubricating film seals out dirt and moisture . . . stays in the bearings . . . requires fewer repackings . . . adds to bearing life and braking safety. No seasonal change is necessary.

More Than 500 Million Pounds Of Texaco Marfak Have Been Sold

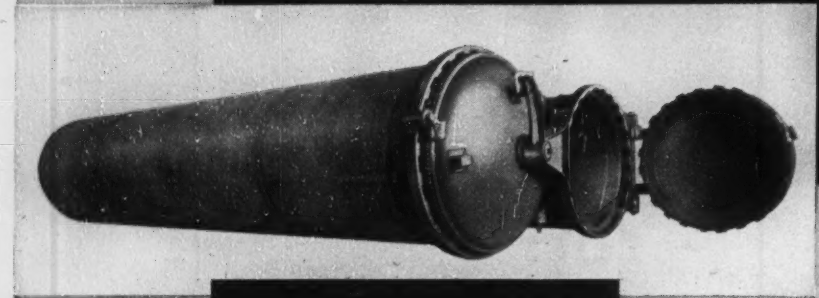
To keep crawlers operating smoothly, lubricate with *Texaco Track Roll Lubricant.* It not only repels dirt and water, but fights wear so that parts life is lengthened and maintenance costs go down.

Let a Texaco Lubrication Engineer show you how to get more from your equipment at lower maintenance expense. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Have You Overlooked This Way To Save Money On



PRESSURE VESSELS?

Posey Iron welded pressure vessels 7' dia. by 38' long fabricated under code requirements.

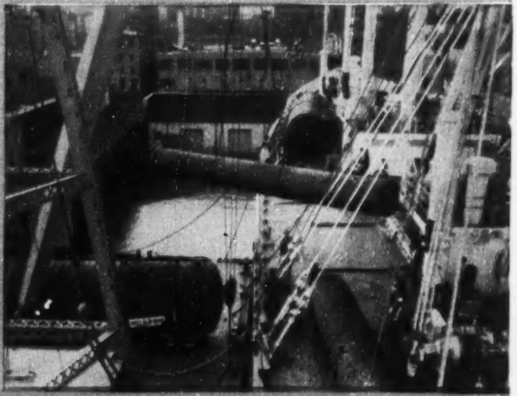
BETTER CHECK!

Check to be sure you're obtaining pressure vessels of highest integrity at advantageous prices. First—ask a Posey Iron Works engineer to call. He'll describe our installations in your field. Then—before you place your next order for pressure vessels—be certain to get a Posey Iron Works estimate.

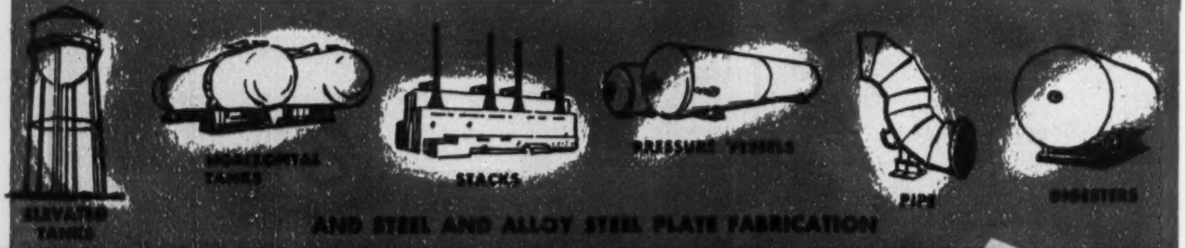
Long field experience teaches Posey Iron Works' engineers to think in down-to-earth terms. Their "hard-boiled", practical approach helps especially while your job is in the planning stage. That's when a Posey Iron engineer has his best chance to pare your costs. That's the time to call him in.

Posey Iron fabricates both large and small vessels . . . for both liquids and gases . . . in steel and alloy steels. All equipment is tested to considerable excess over normal working pressures. All standard codes are met including ASME; API-ASME.

Better check your "pressures" with Posey Iron!



Posey Iron tanks for shipment overseas being loaded aboard freighter.



AND STEEL AND ALLOY STEEL PLATE FABRICATION

POSEY IRON WORKS, INC.
Steel Plate Division
LANCASTER, PA.
New York Office: Graybar Building
ESTABLISHED SINCE 1910

DIVISIONS
Brick Machinery
Foundry
Industrial Heating
Iroquois
Shipbuilding
Steel Plate

(Advertisement)

New Publications Available On Shovel-Cranes

The publications listed below are available free on your request. Write to manufacturer giving title and job classification.

TL-10 Truck Crane Job Picture Book—Full page illustrations and job data on Lorain 6-ton turntable for mounting on your truck chassis in the field.

TL-15 "Series" Catalog—Complete catalog of the ½ yd. class Lorains—crawler and rubber-tire mountings.

MC-104 Moto-Crane Catalog—Shows construction details and job views of the lowest priced Lorain on Lorain-built rubber-tire carrier. Rated: 6-ton as crane—⅜ yd. as shovel.

TL-25 "Series" Catalog—32 pages on the ¾ yd. Lorain (17½ tons as Moto-Crane). Covers Crawler, Moto-Crane and Self-Propelled mounted machines.

TL "Series" Packaged Component Design—The inside story of the Thew-Lorain TL "Series" Lithographed in full color on transparent plastic. Shows major assemblies of turntable in cut-away views. Pages superimpose on one another to "build" the turntable.

"50" Series Catalog—24 pages, in 2 colors of details and job views of the Lorain crawler-mounted 1-yd. machines.

"524" Series Catalog—Describes the companion rubber-tire machines to the "50" Series (30-ton rating as cranes).

"42" Series Catalog—This series available as Moto-Cranes and Self-Propelled only. Rated at 22½ tons as cranes.

"79" Series Catalog—Covers construction details of the 1½ yd. crawler Lorain.

"80" Series Catalog—The 1¾ yd. crawler-mounted Lorain is covered by this catalog.

"820-K" Series Catalog—24 pages, 2 colors. Detailed description and illustrations of the 2-yd. class Lorains. Covers all front ends.

Charge-A-Paver Book—Describes a new front-end that lowers concrete paving costs. Includes operating procedure, pictures and details.

Lorain Hoe Book—The application of Hoes from ⅜ yd. to 2 yds. is graphically covered in 16 pages. Full page job illustrations—operating data.

Tilt-up Construction Book—This book demonstrates in words and pictures the importance of Lorain Cranes to this growing construction technique.

Parts Kits Catalogs—Lorain Parts Kits for replacement and modernization are designed to save Lorain owners money. This 28-page catalog describes and illustrates those available.

Scoop Shovel Book—Completely describes and illustrates the Lorain Scoop Shovel—a front-end attachment for stock-piling, mining and low head-room applications.

All of the above literature is available from The Thew Shovel Co., Lorain, Ohio.

6 WAYS TO PUT MONEY IN YOUR POCKET!

Put a "Lorain-50" on your next job . . . put these 6 features to work making money for you. They are only a few you will get when you put a Lorain-50 to work. They give you a balanced digging cycle, extreme ease of operation, powerful digging and crowding . . . they mean profit on any job you'll tackle. Get the Lorain-50 "Series" money-making story from your nearby Thew-Lorain Distributor today!

THE THEW SHOVEL CO., LORAIN, OHIO

AIR CONTROLS

Air assist controls for hoist, crowd, retract operations. Full air control for 2-way crawler steering and 4-way tread-travel lock.

HYDRAULIC COUPLING

Digging shocks and impacts "melt away". Engine can't stall in any digging. A standard "50" feature, that costs you nothing extra.

CHAIN CROWD

Powerful, positive crowding force transmitted by chain drive. High-speed retract. Power dipper trip — saves fatigue, increases output.

CHOICE OF FOUR CRAWLERS

Don't be penalized by a "misfit" crawler. Choose from standard, long, extra-long and extra-wide crawlers to fit your exact job needs.

CENTER DRIVE

Provides streamlined, direct-to-the-point application of power that concentrates power on any one operation or spreads it in proper balance over simultaneous operations.

ON RUBBER-TIRES, TOO

Advanced, Lorain-50 features are available on rubber-tire machines — 30-ton Moto-Crane, model MC-524; 30-ton Self-Propelled Crane, model SP-524. Five interchangeable front ends.

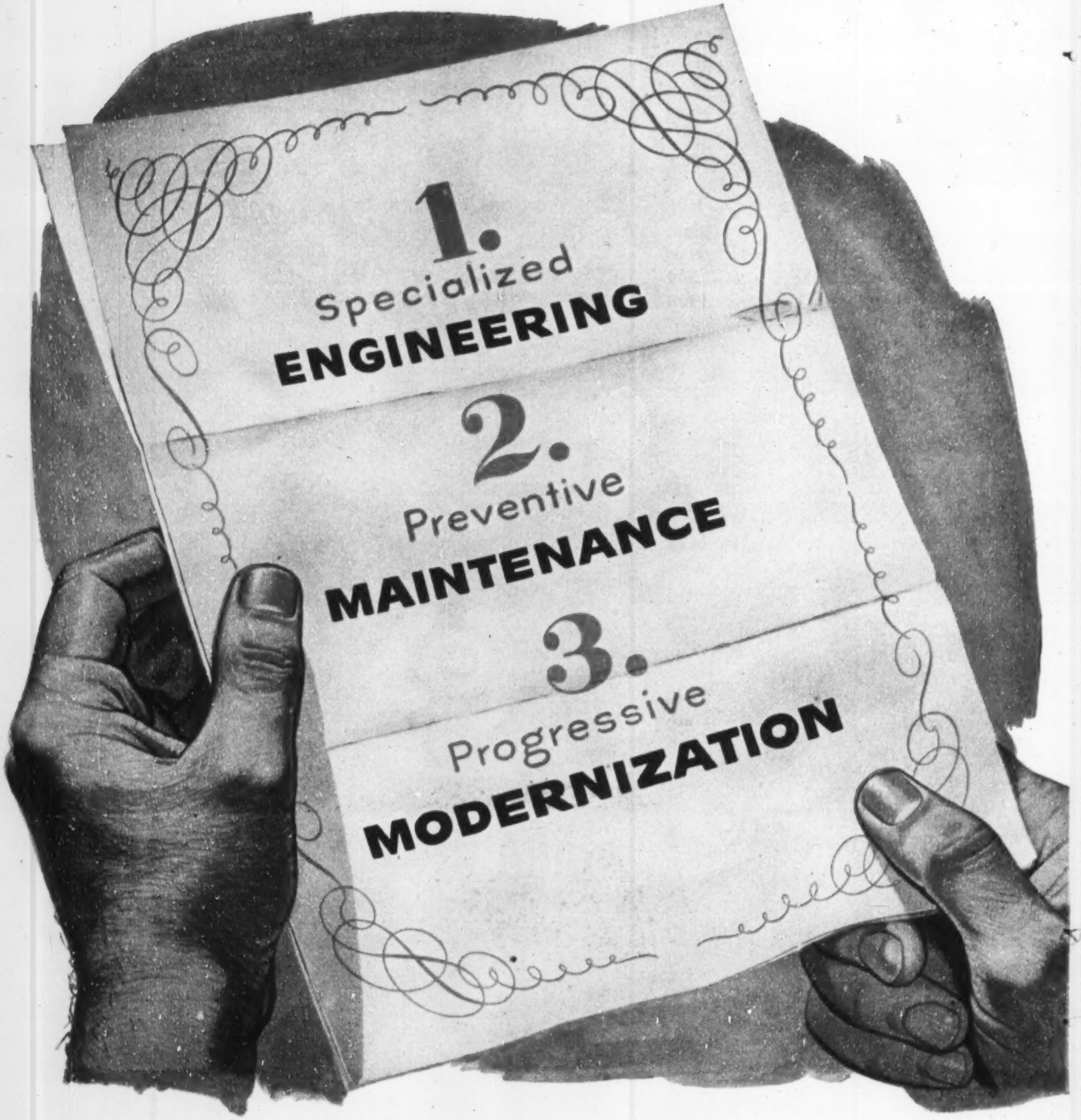
LORAIN 50 SERIES

THE W LORAIN®

OFFERING MORE THAN 136 SHOVEL-CRANE COMBINATIONS ON CRAWLERS OR RUBBER-TIRES TO BEST FIT YOUR JOB FOR PROFIT!

Always-On-Duty

OTIS GENERAL DUTY FREIGHT ELEVATORS


1.
Specialized
ENGINEERING
2.
Preventive
MAINTENANCE
3.
Progressive
MODERNIZATION

"INSURANCE"

HAVE THREE EXTRA FACTORS OF SAFETY

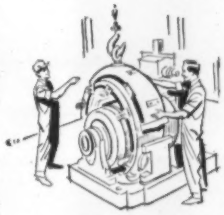
Whenever you need a freight elevator, it should be on duty. It's like a watch. If it isn't running it's useless. And costly. Especially when lack of elevator service holds up a production or materials handling line, or warehouse delivery trucks, or automobile parking, or mining, etc.

You can save money in the long run with Otis general duty freight elevators. They're standardized. They have lifting capacities of 2,500 up to 10,000 lbs. or more. And full safety features, power doors, self-service or attendant operation.

Only Otis freight elevators can offer you always-on-duty "insurance." It's based upon these 3 extra factors of safety.

1 Specialized ENGINEERING

Otis hoisting machines, which are the heart of the installation, are not adaptations of standard commercial equipment. Like every other part of an Otis installation, they're specifically designed to meet the unique requirements of elevator service. And every part is built in Otis plants under rigid quality control. All with a basic knowledge of elevatoring that can't be matched.



2 Preventive MAINTENANCE

Otis maintenance keeps Otis freight elevators performing like new—*year after year!* Otis service is *engineered-service by the maker* that prevents slowdowns and breakdowns; extends elevator life by 50%; eliminates expensive, unexpected repair bills; keeps replacement parts available over 60 years; supplies field-trained men having an aggregate of 21,500 years' elevator experience; provides 24-hour-a-day service on a nationwide basis through 268 offices. All, because we never lose interest in the performance of an Otis installation.

3 Progressive MODERNIZATION

An Otis freight elevator need never become obsolete. New developments are made applicable to existing installations. We strongly recommend planned, progressive modernization as always-on-duty "insurance."

AUTOMATION

You can have freight elevators where you want them, when you want them. The same advanced electronic skill *that developed AUTOTRONIC® completely automatic operatorless elevators for busy office buildings* is ready to make completely automatic freight elevators an integral part of your production line.

* * *

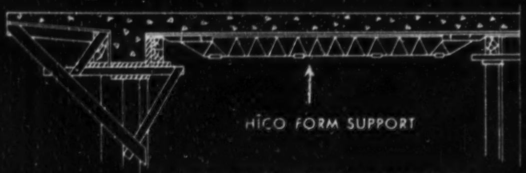
Our broad experience in the field of industrial elevatoring qualifies us to advise on standard or special adaptations of Otis elevators for unusual freight handling requirements. This experience is available for any size installation, however large—or small. Call any of our 268 offices for details.

Otis Elevator Company
260 11th Ave., New York 1, N. Y.

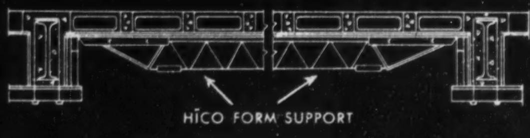
Otis FREIGHT ELEVATORS

HEAVY DUTY · GENERAL DUTY · LIGHT DUTY

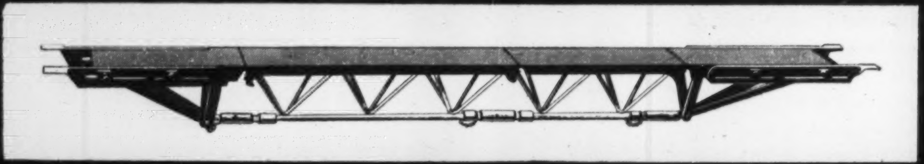
HICO* supports | adaptable to all types of construction

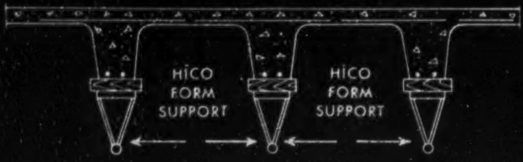


REINFORCED CONCRETE CONSTRUCTION

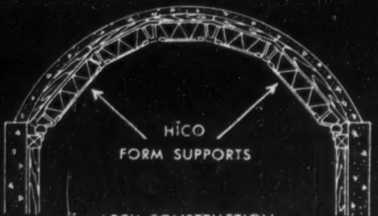


STRUCTURAL STEEL WITH PRECAST BLOCK





CONCRETE JOIST CONSTRUCTION



ARCH CONSTRUCTION

new horizontal form supports cut shoring costs up to 40%

Adaptability is one of the main reasons why HICO steel form supports save money. Each support is composed of sections of varying lengths. Special end pieces assure adaptability to all types of vertical supports. Using combinations of these components, complete horizontal supports in a variety of lengths up to 27 feet may be assembled in minutes. As a result, the same basic HICO sections can be used again and again on a wide range of construction projects. Other advantages are listed below.

TIME SAVING

Can be erected and stripped in 1/3 the time needed for ordinary form supports. No special tools needed. HICO steel supports are delivered completely assembled and tagged to show exact locations according to plans. Because no vertical center supports are needed, work can continue on floor below, cutting over-all construction time.

LOW COST

Savings in construction time naturally cut construction costs. In addition, reuse factor permits amortization of initial costs over many jobs.

LIGHTNESS

Weigh 8 1/3 lbs. per foot, any section easily carried.

DEFLECTION COMPENSATION

Tightening of special turnbuckle device at bottom of span controls camber of span which compensates for deflection due to slab weight; assures even, level surfaces.

EFFICIENCY

No center supports needed. Engineering design assures tremendous strength and exceptionally high resistance to buckling.

STRENGTH

Carries forms and concrete on clear spans up to 27 feet.

DURABILITY

Each HICO section may be reused 100 times or more.

HICO FORM SUPPORTS may be purchased outright or leased with an option to buy. If leased, rental may be applied against purchase price. HICO engineers will be happy to consult with you concerning your particular requirements. In addition they will furnish detailed layout plans showing number and type of HICO form supports required and, if desired, will work with contractor at job site to familiarize him with all phases of the product.

*Trade Mark.

U. S. Patent No. 2,687,193. Other Patents Pending.

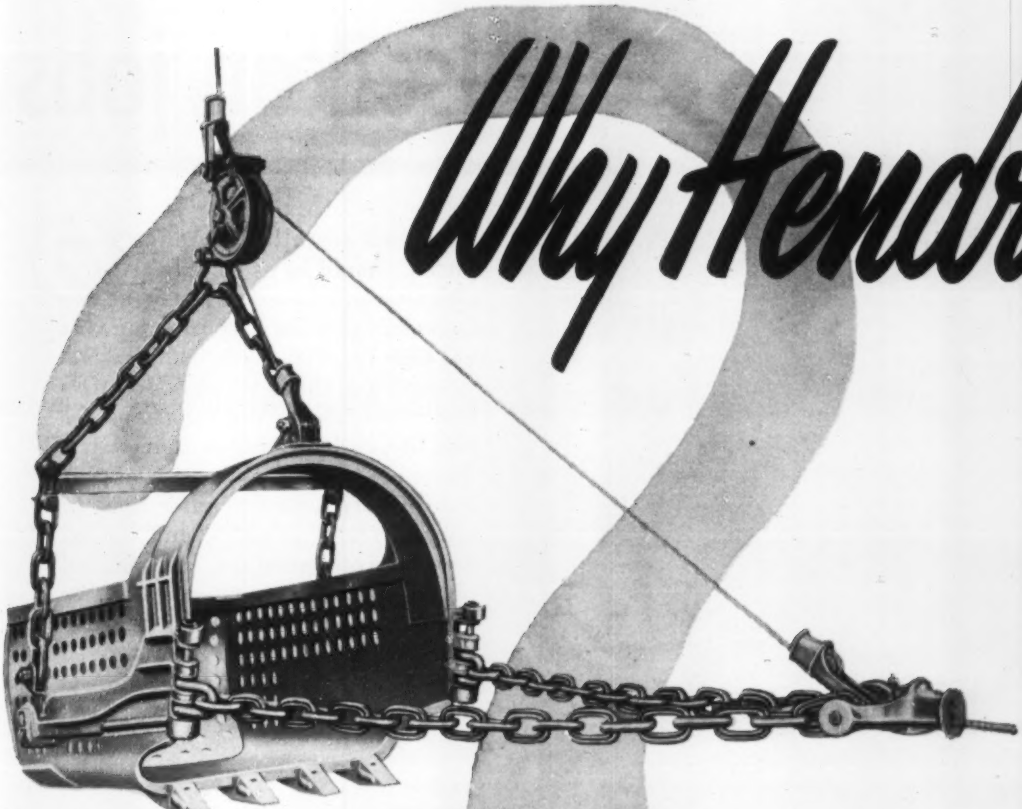
For complete information, technical data and prices, write Dept. E-2, Webrib Steel Corp.

HICO* ADJUSTABLE HORIZONTAL FORM SUPPORTS

A PRODUCT OF **WEBRIB STEEL CORPORATION**
120 Broadway, New York 5, New York. DIgby 9-1650.

NOTICE TO DISTRIBUTORS. There are still some territories open in the United States. Write for details.

Why Hendrix



. . . because **HENDRIX** from the first has devoted its entire facilities to the manufacture and development of dragline buckets. Result — sturdy dragline buckets unsurpassed for day in and day out operation on every job . . . engineered to dig more in less time for **GREATER PROFITS!**

3/8 to 40 Cubic Yards

Hendrix Lightweight Dragline Buckets

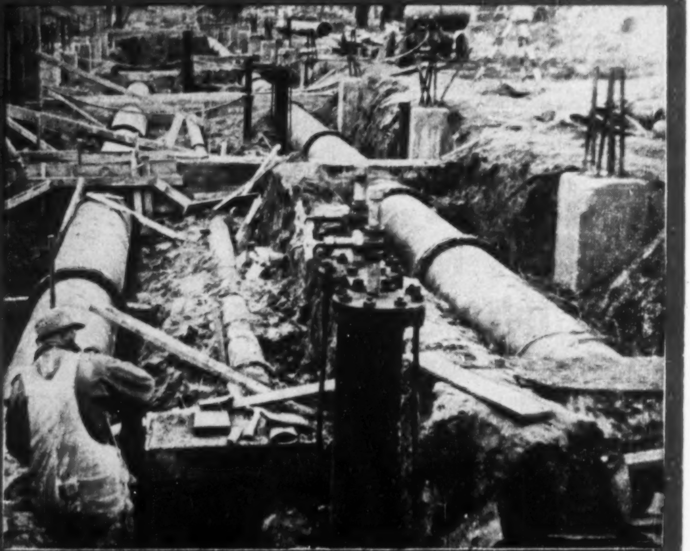
A TYPE AND SIZE FOR
EVERY DIGGING PURPOSE

Hendrix Buckets available without perforations on special order.

HENDRIX MANUFACTURING CO., Inc.
MANSFIELD, LOUISIANA

Used on jobs

When an installation, once completed, should be as trouble-proof as planning and materials can make it—engineers rely on cast iron pipe. It has high beam-strength, compressive-strength and shock-strength. Its effective resistance to corrosion ensures long life, underground or underwater. These are reasons why cast iron pipe is so widely used for water lines in tough terrain, pressure and outfall sewers, river crossings, and encased piping in sewage treatment and water filtration plants. For further information write: Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Ill.



(above)
Cast iron mechanical joint pipe installed in connection with a new, larger sewage treatment plant at Rochester, Minn.

(at right)
Installing cast iron mechanical joint pipe used in air-conditioning system for Northland Shopping Center, Detroit, Mich.

CAST IRON PIPE

where long life is a "must"

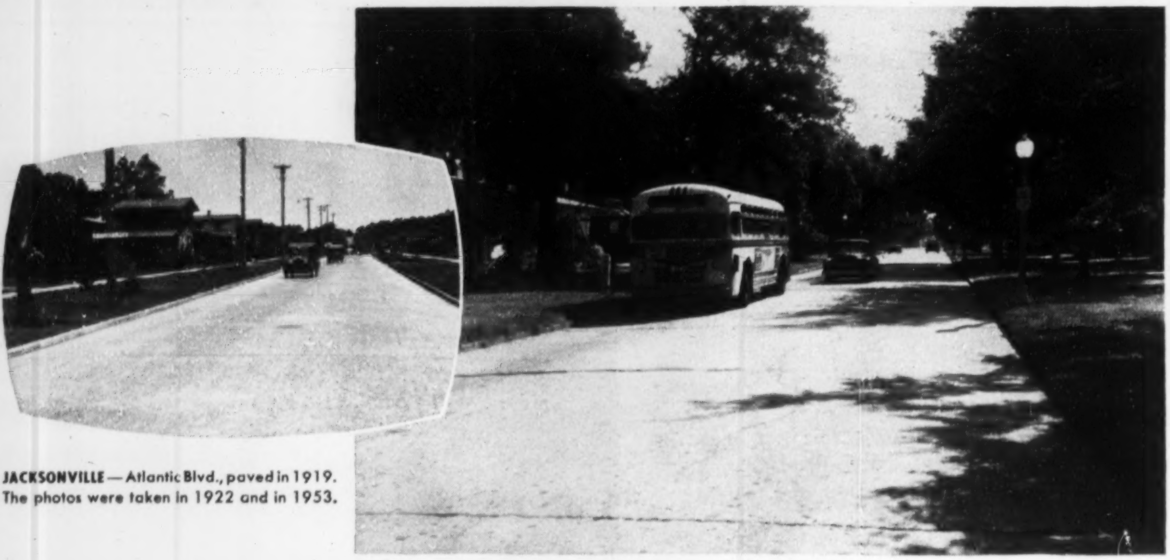
®

(top right)
Installing large diameter cast iron pipe across Willamette River at Portland, Oregon for sewer line to interceptors and to new disposal plant.

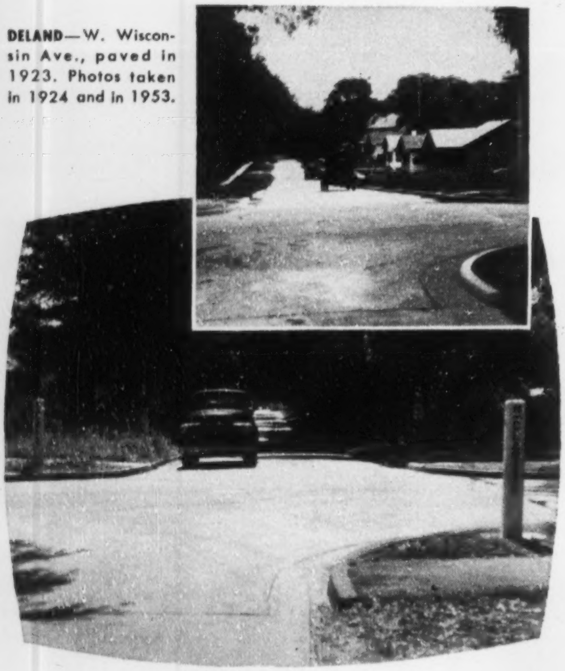
(below)
Seven miles of 16-inch mechanical joint cast iron pipe installed for gas main in New Jersey.

(at right)
Installation of cast iron pipe for irrigation and sprinkling system for a Chicago park.

SERVES FOR CENTURIES...



JACKSONVILLE—Atlantic Blvd., paved in 1919. The photos were taken in 1922 and in 1953.



DELAND—W. Wisconsin Ave., paved in 1923. Photos taken in 1924 and in 1953.

HERE TODAY *and still here tomorrow*

that's the story of Florida's CONCRETE STREETS

Here's what our cameraman found when he returned to the same concrete streets in Florida that we photographed a generation ago. His photos are irrefutable evidence of concrete's durability and economy.

Durability and low-annual-cost service are typical of concrete pavements. Due to advances in engineering design, materials and construction methods, concrete pavements today can be built to last at least 50 years.

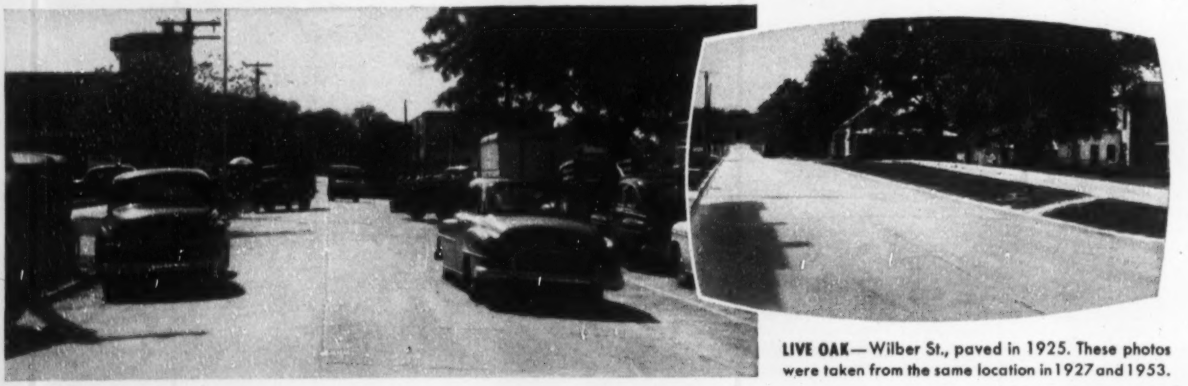
Concrete streets are safest, too. Their gritty, skid-resistant surface permits quick stops—wet or dry. At night, their light color gives maximum visibility. *You're safer when you can see. You can see better on concrete!*

For more information about designing durable, safe, ***low-annual-cost*** concrete streets, write for free literature, distributed only in the United States and Canada.

PORTLAND CEMENT ASSOCIATION

A national organization to improve and extend the uses of portland cement and concrete... through scientific research and engineering field work

Dept. 10a-17, 33 West Grand Avenue, Chicago 10, Illinois



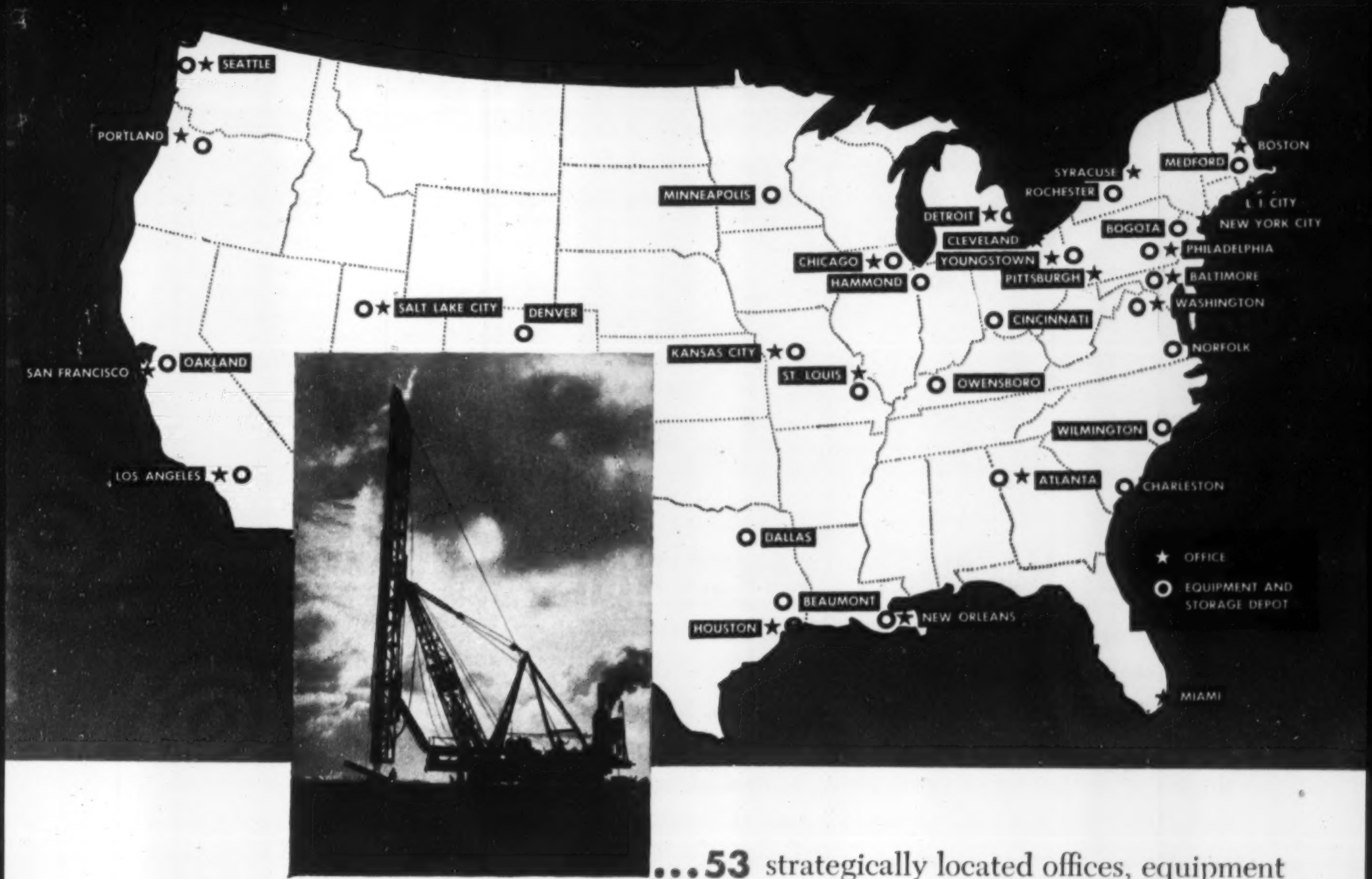
LIVE OAK—Wilber St., paved in 1925. These photos were taken from the same location in 1927 and 1953.

Raymond Features!

NUMBER FIVE OF A SERIES

Raymond serves

FROM COAST TO COAST!


SEATTLE
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CHICAGO
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★ OFFICE
O EQUIPMENT AND STORAGE DEPOT

. . . 53 strategically located offices, equipment and storage depots are ready to serve you wherever your project is located. This wide distribution of personnel and facilities is one more reason why you can depend upon a swift, efficient and economical operation when you call on Raymond.

RAYMOND'S DOMESTIC SERVICES . . .

Soil Investigations • Foundation Construction • Harbor and Waterfront Improvements • Prestressed Concrete Construction • Cement-mortar Lining of Water, Oil and Gas Pipelines In Place.

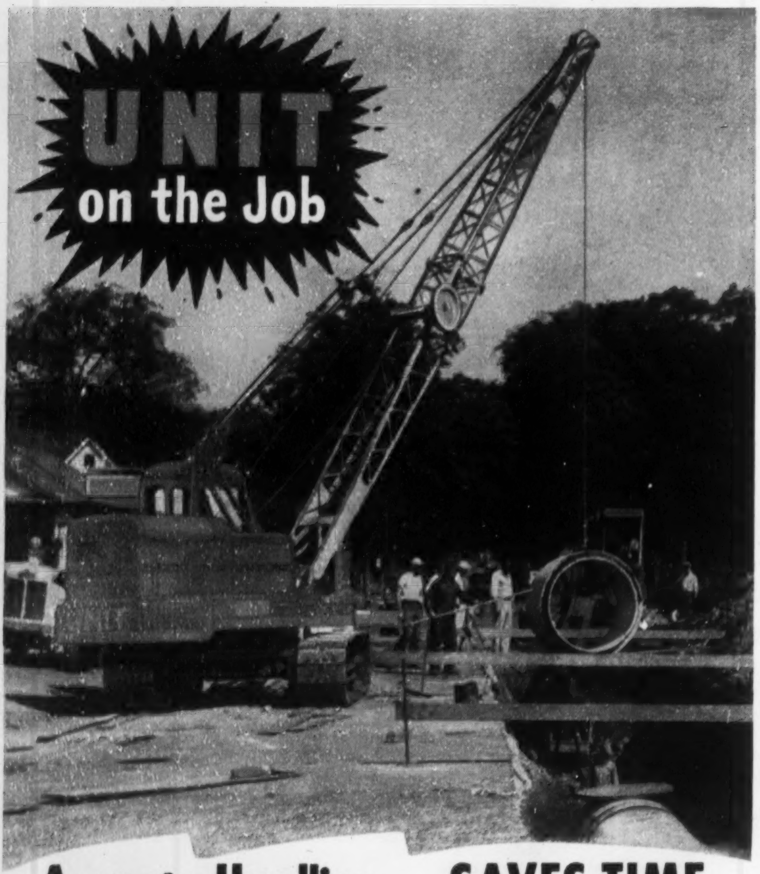
RAYMOND'S SERVICES ABROAD . . .

In addition to the above, all types of General Construction.

Raymond

CONCRETE PILE CO.

140 Cedar Street • New York 6, N. Y.



Accurate Handling . . . SAVES TIME

This sturdy UNIT Crawler Crane offers plenty of power plus accurate control. Spots heavy sewer pipe perfectly into the desired position. Adjustable Hook Rollers, Extra Long Crawlers and Wide Multiple Hinged Crawler Shoes provide all-around stability. Full Circle Swing, controlled from within UNIT'S FULL VISION CAB, provides safe and efficient operation. The operator has a complete view of the entire job at all times. GET THE FACTS! Investigate this modern UNIT and its many features. Write today for literature.

UNIT CRANE & SHOVEL CORPORATION
6315 WEST BURNHAM STREET • MILWAUKEE 14, WISCONSIN, U. S. A.

½ or ¾ YARD EXCAVATORS. . CRANES UP TO 20 TONS CAPACITY
CRAWLER OR MOBILE MODELS . . . GASOLINE OR DIESEL

SHOVEL
DRAG
CLAM
HOE
CRANE
MAGNET

All Models Convertible to ALL Attachments!

READER COMMENT

Was this bidding?

Sir: On page 21 of the Sept. 9 issue of Engineering News-Record you report the action of the ASCE Board of Direction in the case of violation of ethics for bidding on South Carolina work.

On page 77 of the same issue under positions wanted the following ad appears:

> "ESTIMATOR: For Highway and Railroad Bridge Construction and Restoration in Southeast Ohio and adjoining states. Must have supervisory background and be cost conscious. Thorough experience essential. State experience, references, personal information and SALARY EXPECTED. Good chance for the right person. Reply P-3847, Engineering News-Record."

My question is this: Does the applicant for this position "participate in competitive bidding on a price basis to secure a professional engagement"?

M. F. Johnson, *Director,*
Department of Highways
Frankfort, Ky.

Folded-plate costs are low

Sir: Milo S. Ketchum has furnished a highly interesting account of his design with reinforced concrete folded-plate construction (ENR Sept. 2, p. 38). It was valuable to learn what it cost to construct this design, however, it would be even more useful to know what the shell roof alone cost in place.

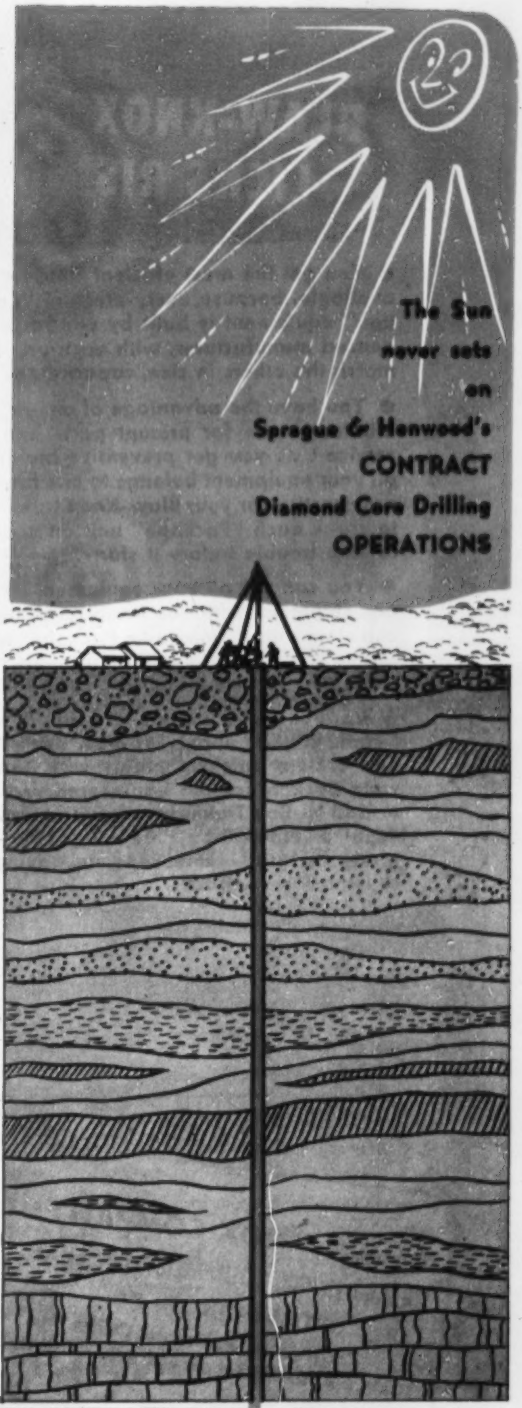
I find this type of construction highly economical, and frequently desirable from several points of view. I prefer to call it "pitched plate", and agree with the author that "hipped plate" is inappropriate.

Since 1950, we have designed twelve structures with the folded-plate design principle. Transverse spans varied from 45 to 60 ft, and longitudinal spans up to 130 ft. One of these—for a large bakery—may be worth describing because it is comparable to Ketchum's building.

Of continuous concrete construction, a 170x365-ft wing of the bakery has columns spaced 55, 60 and 55 ft c-c across its width and 52 ft c-c lengthwise. The shell roof is continuous over three spans in the 170-ft direction, with valleys 18 ft above the floor. Each 52-ft bay is spanned by three slabs, two with a pitch of 4½: 12, joined by a horizontal plate with 4

(*Continued on page 26*)

Foundation Exploration



The Delaware Memorial Bridge, The New York State Thruway, The New Jersey Turnpike and the Maine Turnpike are only a few of the important engineering achievements for which we have been privileged, by leading engineering and contracting organizations, to make some or all of the foundation test borings.

For more than sixty years we have been leaders in the field of Diamond Core Drilling, Soil Sampling and other types of testing for the foundations of Bridges, Dams, Large Buildings, Airports, Highways, etc. and have established an unsurpassed reputation for prompt service and reliable information. Besides exploratory drilling our service includes grout-hole drilling and pressure grouting.

Today, we have a large force of expert operators and an ample supply of modern equipment, so that we can undertake practically any job on short notice. Estimates submitted promptly on request—quick action when you need it.

SPRAGUE & HENWOOD, INC.

SCRANTON 2, PENNA.

NEW YORK PHILADELPHIA PITTSBURGH
GRAND JUNCTION, COL. BUCHANS, NEWFOUNDLAND

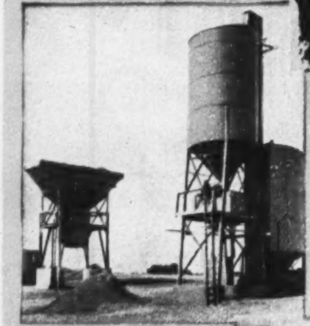
Leading Manufacturers, also, of High-Speed Diamond Core Drilling Machines, "Oriented" Diamond Bits and a complete line of Improved Accessory Equipment for Core Drilling and Soil Sampling. Write for illustrated catalogues containing complete specifications and all necessary working data on:

- Auger Bits, all types
- Bails, lifting
- Ball-Bearing Waterswivels
- Bits, Diamond
- Bits, Blank
- Bits, Chopping
- Bushings, Rod & Casing
- Casing, Flush Coupled
- Casing Taps
- Clinometers
- Corebarrels, all types
- Corebarrel Taps
- Core Lifters
- Couplings, Rod
- Derrick Sheaves
- Drill Rods
- Drilling Machines
- Drive Hammers
- Drive Heads
- Drive Pipe
- Drive Pipe Couplings
- Drive Shoes
- Extensions, Core Barrel
- Fishing Tools
- Fishtail Bits
- Flush Coupled Casing
- Foot Safety Clamps
- Hoisting Hooks
- Hoisting Plugs
- Hoisting Plug Reducers
- Hoisting Rings
- Hose, Waterswivel
- Hose, Suction
- Jar Lengths
- Jaws, Safety Clamp
- Lifters, Rod
- Mud Bits
- Pilot Reamers
- Plugs, Hoisting
- Pressure Testers
- Protectors, Casing
- Reamer Shells
- Reducers, Rod
- Rods, Drill
- Rod Couplings
- Rod Taps
- Rose Bits
- Safety Clamps
- Sawtooth Bits
- Sheave Wheels
- Soil Samplers
- Subs
- Taps, Fishing
- Testers, Sample
- Testers, Pressure
- Wash Plugs
- Water Swivels

HERE'S HOW THE BLAW-KNOX *"Complete Paving Package"* LICKS RISING PRODUCTION COSTS

- You get the most efficient concrete paving outfit available, because every piece of "Complete Package" equipment is built by one responsible, experienced manufacturer, with each unit engineered to match the others in size, capacity and performance.
- You have the advantage of one nation-wide distributor source for prompt parts and maintenance service . . . you get *preventive* maintenance when all your equipment belongs to one family. It's standard practice for your Blaw-Knox trained service man to check each "Package" unit on each service call, to stop trouble before it starts.
- You can get *all* your equipment on one order, in one shipment, with one financial contact . . . or you can start with a "Minimum Package" to fit your particular job, then buy additional units as your needs increase and your profits grow.
- Various combinations of your "Package" units handle a wide variety of jobs. Use your aggregate and cement batching plants with Blaw-Knox Concrete Buckets for big engineered construction jobs, or add Hi-Boy Trukmixers for ready-mix operations. With a Blaw-Knox "Complete Package" you're ready to handle any concrete paving or concrete construction contract!

CLAMSHELL BUCKETS



PRECISION SUBGRADERS

MULTIFOOTE PAVERS
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BLAW-KNOX COMPANY
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PITTSBURGH 38, PA.
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Ask your Blaw-Knox distributor about the
BLAW-KNOX "COMPLETE PACKAGE" SYSTEM for

- Paving and Widening Highways, Streets, Runways
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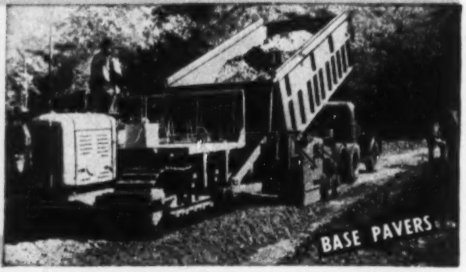
Each Blaw-Knox "Package" is engineered for your specific job to give you big-profit production with low maintenance and operating costs.



WHEN THE GOING IS TOUGH

TOUGH! Using Rear Steer to angle the bulldozer blade and spill the material over the side of the fill. Impossible with any other grader-bulldozer.

TOUGHER! Rocks and earth are needed to repair this washout. Traction is ample. Powerful drivers hold front end steady.

TOUGHEST! Clearing boulders from the bed of a rushing mountain stream to open a ford around a bridge.

YOU NEED THE POWER AND TRACTION OF AUSTIN-WESTERN'S ALL-WHEEL DRIVE

Good going or bad . . . earth, stumps or rocks . . . this fast, hydraulically operated bulldozer can do work far beyond the range of such an attachment on an ordinary motor grader, thanks to the extra power of All-Wheel Drive and super-maneuverability of exclusive All-Wheel Steer. By swinging the rear end of the grader to right or left, the machine can be used as an angledozer.

The bulldozer blade is of welded steel construction, heavily built and reinforced to handle successfully work of the rough-and-tumble variety pictured on this page, and move maximum amounts of material when the going is easier.

There is constant or intermittent need for a bulldozer on many road construction and heavy maintenance operations. On rugged Austin-Western Power Graders, this attachment eliminates the necessity of tying up extra equipment for the occasional job; is an essential on many jobs and a time and money saver on dozens of others.

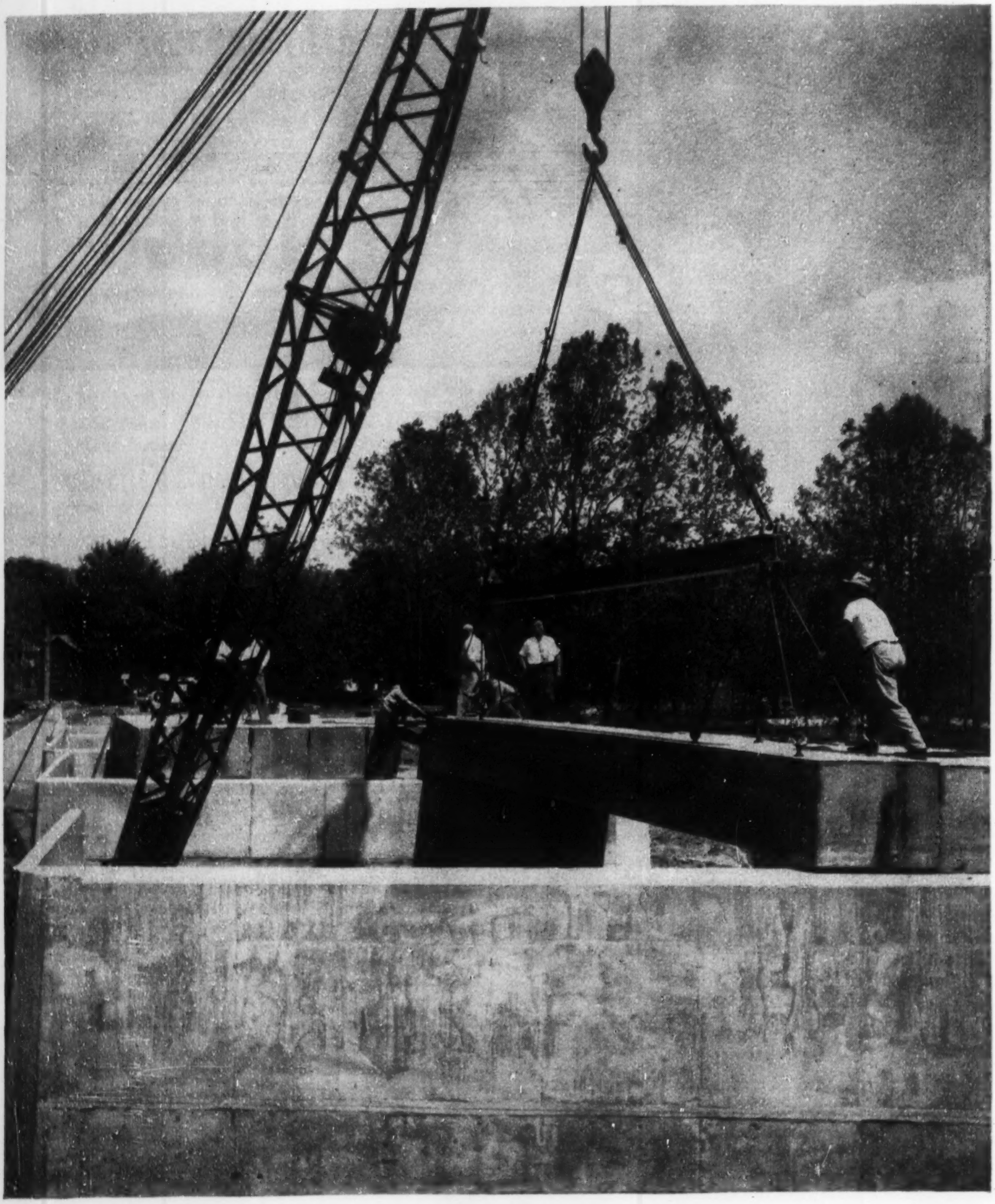
Austin-Western

Power Graders · Motor Sweepers
Road Rollers · Hydraulic Cranes

BALDWIN BLH LIMA-HAMILTON
Construction Equipment Division

Manufactured by
AUSTIN-WESTERN COMPANY
Subsidiary of Baldwin-Lima-Hamilton Corporation
AURORA, ILLINOIS, U.S.A.

Installed cost



reduced 25% by

prestressing with Type PS

American Strand

● The prestressed members of this concrete bridge in Pennsylvania cost about 25% less, installed, than conventional built-in-place members of equivalent strength. These beams were pretensioned with Type PS American Strand to give them extra strength and durability at lower cost.

Maybe you don't use strand in your prestressed concrete. You may prefer a method that utilizes wire instead of strand. You may prefer post-tensioning to pretensioning. You may prefer site-casting to factory fabrication. Whatever type of prestressing you decide upon, you can get an American *Super-Tens* Wire or Type PS American Strand that suits your job. These products have been thoroughly tested and proved *in service* on hundreds of prestressed concrete structures.

On these many jobs, our engineers have learned a great deal about all types of prestressing. They'll be glad to help you on your next job. Just send the coupon.

American Steel & Wire
Room 842, Rockefeller Building
Cleveland 13, Ohio

I want all the facts about American *Super-Tens* Wire and Type PS American Strand.

☐ Send me your free booklet, which contains technical data.

☐ Have your local representative call on me as soon as possible.

Name.......................... Title............

Company..

Address..

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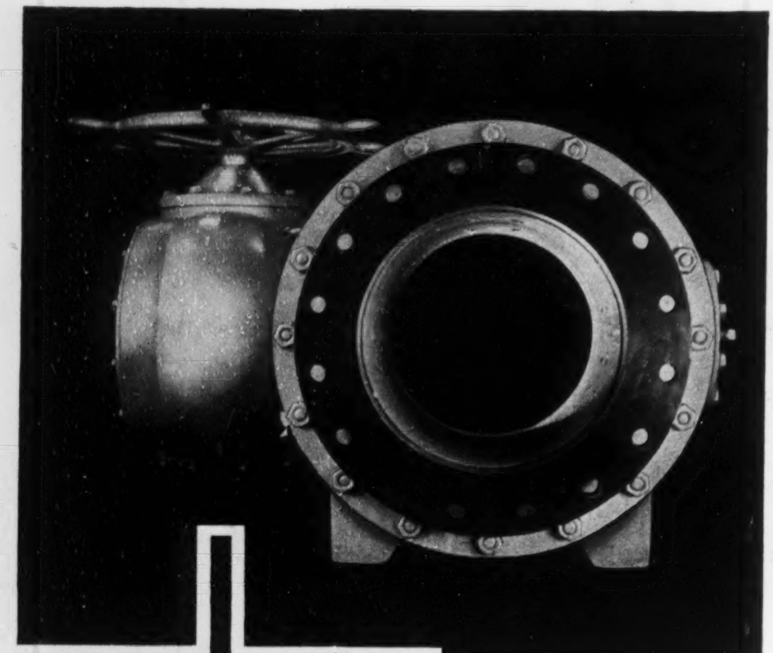
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS AMERICAN *Super-Tens* WIRE
***and* TYPE PS AMERICAN STRAND**

USS

UNITED STATES STEEL



SMS

BALL VALVES

a new achievement
in valve performance . . .

STRAIGHT-THROUGH FLOW
WITH DROP-TIGHT CLOSURE

For the path of least resistance — the new SMS-Ball Valve has no equal in design or price. When open, the valve is like a straight piece of pipe — nothing to resist flow and create resultant pressure drop, thereby reducing pumping costs. Elimination of turbulence adds to valve and pipe life.

EASE OF OPERATION — Forces required for opening and closing are remarkably low even under adverse conditions. The tremendous leverage exerted by the operating mechanism affords complete ease of operation. Flow velocity tends to ease closing.

TIGHTNESS OF CLOSURE — Drop-tight closure is obtained by the wedging action of the metal-to-metal seats.

SMS-Ball Valves afford high performance at significant in-place savings. Costs compared to valves giving similar performance are appreciably less. Write for our new Ball Valve folder.

This new valve, as well as our full line of cone and butterfly valves, is backed by over 75 years experience in hydraulic design and research. For full information on your valve problem, see your local representative, or write to S. Morgan Smith Company, York, Pennsylvania.

Hydraulic Turbines
Pumps
Gates & Hoists
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Accessories

HYDRODYNAMICS

Rotovalves
Ball Valves
Butterfly Valves
Free-Discharge Valves
Controllable-Pitch Ship Propellers

SMS
S. MORGAN SMITH CO.

READER COMMENT

(Continued from page 20)

to 8-ft-square openings for skylights. Made of 3,000-psi concrete, the slabs are 4 in. thick. Prestressed stiffeners or ties are nearly all on the upper side of the roof, to maintain clear height inside.

Bids for this structure, which required large mechanical and electrical installations and which is founded on bellied caissons 15 ft below grade, were taken last winter (but construction has not started yet). The low bid came to $8.30 per sq ft. Five contractors submitted a unit cost for the prestressed concrete shell roof of $1.20 per sq ft.

Unit costs of shell roofs in place for our other designs varied from $0.90 (in 1950) to $1.50 per sq ft, depending on height of roof and span. Eaves height varied from 18 to 30 ft for these structures.

Two designs employed concrete-joist construction for the transverse spans of two-plate roofs. Cost of forming these was about equal to the cost for slabs and largely explains the economy of this type of construction. For transverse spans of 45 to 90 ft I know of no other system that is as economical when fire resistance is desired or when ceiling treatment other than exposed framing is wanted.

JOHN J. DRISKELL
Structural Engineer
San Gabriel, Calif.

CALENDAR

Federation of Sewage and Industrial Wastes Associations, Netherland Plaza Hotel, Cincinnati, Oct. 11-14.

National Conference on Industrial Hydraulics, annual meeting, Sheraton Hotel, Chicago, Oct. 14-15.

Structural Engineers Association of California, Hotel del Coronado, Coronado, Calif., Oct. 14-16.

National Society of Professional Engineers, annual fall meeting, Hotel Fontenelle, Omaha, Neb., Oct. 15-16.

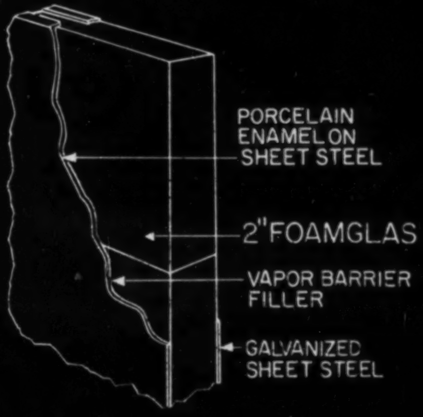
American Society of Civil Engineers, annual convention, Hotel Statler, New York City, Oct. 18-22.

American Institute of Steel Construction, annual convention, Greenbrier Hotel, White Sulphur Springs, W. Va., Oct. 25-28.

Plastics in Building, conference being sponsored jointly by the Society of the Plastics Industry, Inc., the Manufacturing Chemists' Association, and the Building Research Advisory Board, at the National Academy of Sciences, Washington, D. C., Oct. 27-28.

American Concrete Institute, regional meeting, Statler Hotel, Los Angeles, Oct. 28-29.

Engineers Council for Professional Development, annual meeting, Alms Hotel, Cincinnati, Oct. 28-29.



Architects: Kivett & Meyers, A.I.A.
Angus McCallum, A.I.A. Associate
Kansas City, Mo.

Panel Fabricator: Barrows Porcelain Enamel Co.
Cincinnati, Ohio

General Contractor: Frank Quinlan Construction Co.
Kansas City, Mo.

Light-weight, waterproof FOAMGLAS proved ideal insulation for curtain wall panels at Douglass Elementary School, Kansas City, Missouri

Light-weight and waterproof, FOAMGLAS proved to be the ideal insulation for prefabricated curtain wall panels used on the new Douglass Elementary School, Kansas City, Missouri. This unique cellular glass insulation used as the core of porcelain faced panels for the new School, has been a major factor in making them a success.

The Douglass School panels were designed to secure ideal performance in non-load bearing curtain wall construction. They had to be light, rigid and weather-proof, with consistently good insulating qualities. They had to be free from possible deterioration and the formation of moisture traps. They must also be fireproof, vermin-proof and require little maintenance. FOAMGLAS is the only insulation that meets all these requirements. Here's why:

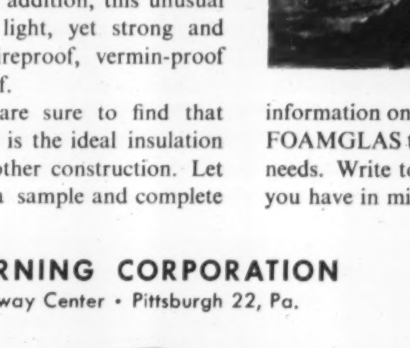
Since the sealed glass cells of FOAMGLAS are impervious to moisture, its insulating performance is consistent and long-lasting . . . reducing costly maintenance and replacement. In addition, this unusual insulation is light, yet strong and rigid. It is fireproof, vermin-proof and acid-proof.

You, too, are sure to find that FOAMGLAS is the ideal insulation for panel or other construction. Let us send you a sample and complete information on how you can best use FOAMGLAS to meet your insulating needs. Write today telling us the use you have in mind.

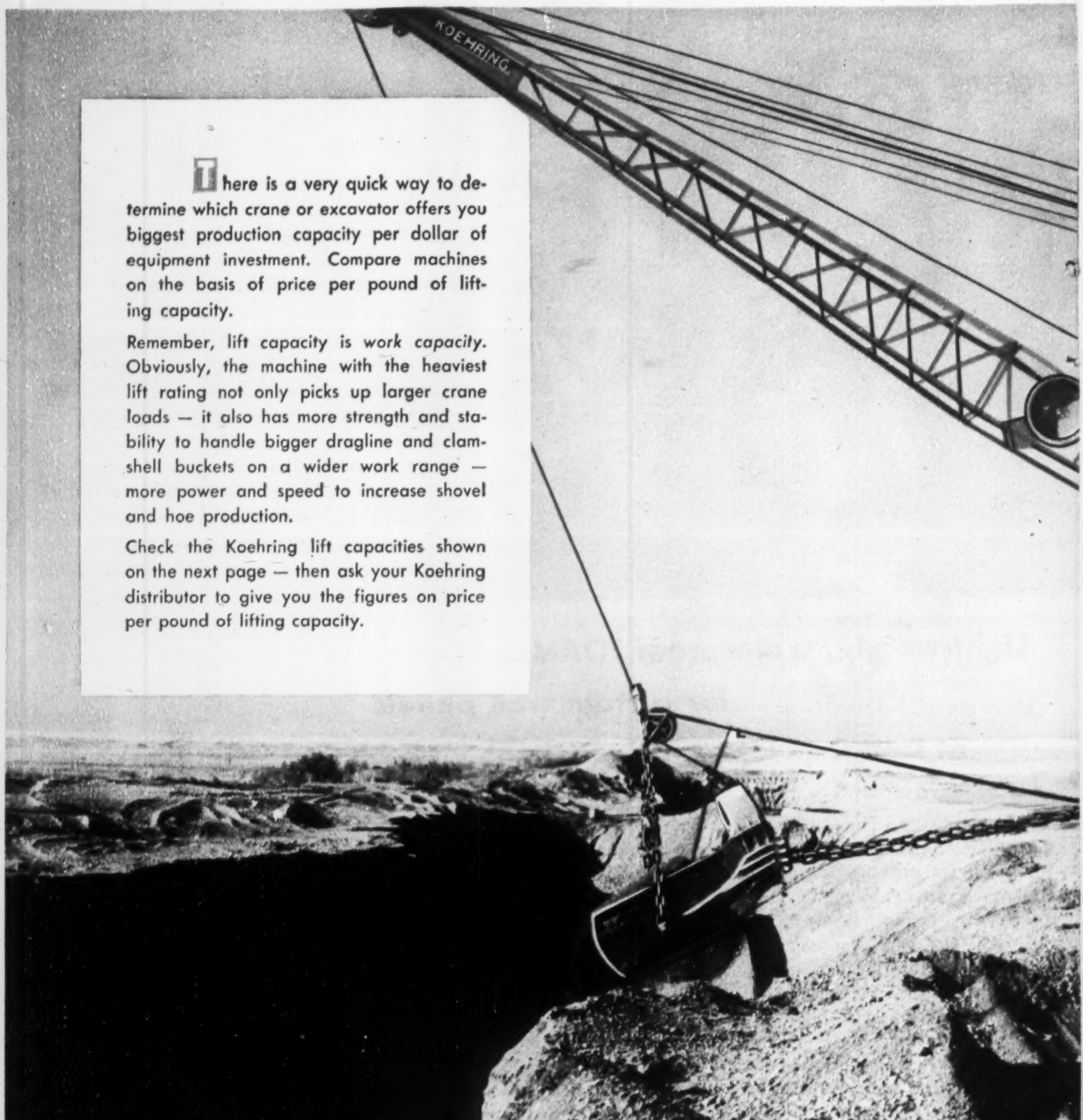
PITTSBURGH CORNING CORPORATION
Dept. K-104, One Gateway Center • Pittsburgh 22, Pa.

FOAMGLAS®

the cellular, stay-dry insulation



Pittsburgh Corning also makes PC Glass Blocks

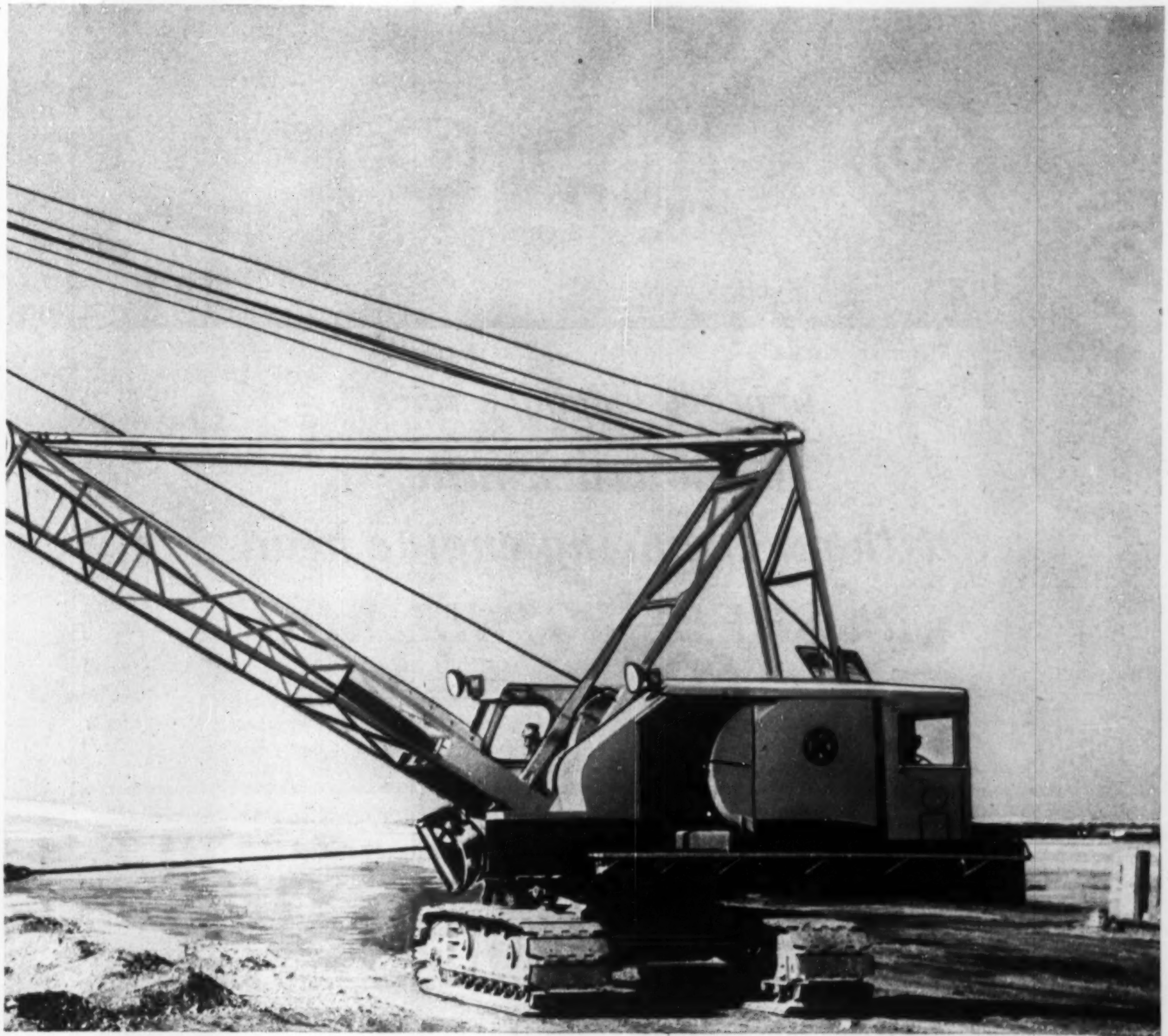


There is a very quick way to determine which crane or excavator offers you biggest production capacity per dollar of equipment investment. Compare machines on the basis of price per pound of lifting capacity.

Remember, lift capacity is *work capacity*. Obviously, the machine with the heaviest lift rating not only picks up larger crane loads — it also has more strength and stability to handle bigger dragline and clamshell buckets on a wider work range — more power and speed to increase shovel and hoe production.

Check the Koehring lift capacities shown on the next page — then ask your Koehring distributor to give you the figures on price per pound of lifting capacity.

KOEHRING COMPANY Milwaukee 16, Wis. Subsidiaries: JOHNSON PARSONS - KWIK-MIX



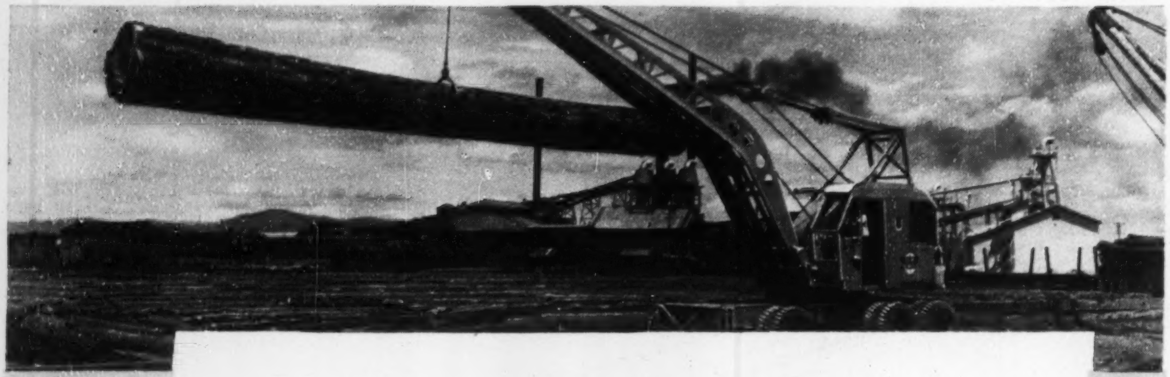
Check price per pound of lifting capacity

KOEHRING MODEL	SIZE DIPPER	KOEHRING LIFT CAPACITIES (Crawler ratings based on 75% of tipping load. Rubber-tired machines — 85% of tipping load)		PRICE PER POUND OF LIFT CAPACITY*
205 CRAWLER	½-Yd.	20,000 lbs.	30-foot boom at 10-ft. radius	?
205 ON RUBBER	½-Yd.	30,000 lbs.	25-foot boom at 12-ft. radius	?
304 CRAWLER	¾-Yd.	27,800 lbs.	35-foot boom at 12-ft. radius	?
304 ON RUBBER	¾-Yd.	50,000 lbs.	30-foot boom at 10-ft. radius	?
405 CRAWLER	1-Yd.	40,000 lbs.	40-foot boom at 12-ft. radius	?
605 CRAWLER	1½-Yds.	72,300 lbs.	50-foot boom at 12-ft. radius	?
1005 CRAWLER	2½-Yds.	159,000 lbs.	50-foot boom at 12-ft. radius	?

**Figures available on request—ask your Koehring distributor for them.*

KOEHRING K HEAVY DUTY

K-30



In heavy logging service

80,000 truck miles without removing engine head with SHELL ROTELLA OIL

LIKE MANY OPERATORS of heavy duty gasoline and diesel engines Deer Park Pine Industry, Inc., Deer Park, Washington, has found it *pays* to use Shell Rotella Oil:

- One of the company's trucks has gone 80,000 logging miles using Shell Rotella Oil and the engine head has never been removed.
- One D-7 Caterpillar was torn down for the first time after 9,000 hours of operation . . . cylinder walls showed only the slightest taper. Because of this, the oil change period has been extended from 40 hours to 80 hours.
- One P. & H. loader has run for *ten years* with only two major overhauls.

Here are the reasons Shell Rotella Oil has been adopted as the crankcase lubricant by hundreds of heavy duty equipment operators from coast to coast.

1. Superior anti-wear protection
2. Highest oxidation stability
3. Excellent detergent-dispersant action
4. Protection against bearing corrosion
5. Maximum engine service life
6. Greatest over-all economy

Send for the latest technical information on Shell Rotella Oil. See how Shell Rotella Oil gives outstanding, low cost lubrication.

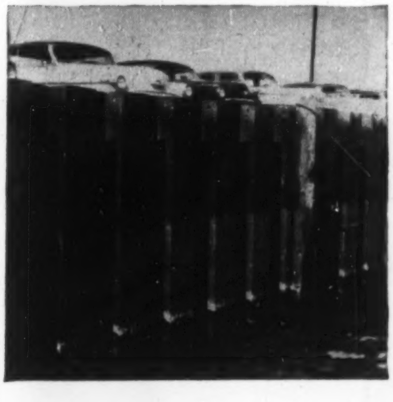
SHELL OIL COMPANY

50 West 50th Street, New York 20, N.Y. • 100 Bush Street, San Francisco 6, Calif.

SHELL

CORROSION-FIGHTING NEWS

PITT CHEM puts the Crimp on Sea Wall Corrosion



Keeping steel from being eaten alive by sea water is one of the corrosion engineer's toughest headaches. The busy Long Beach Port Harbor is solving the problem by the application of Pitt Chem Tar Base Coatings to its steel sea wall piling.

Sprayed with a 3/16" film of tar base coating, the exposed area of the 70-foot-long steel "Z" sections resist both the electrolytic action of the salt water and corrosion of the salt air. Pitt Chem Coatings also provide watertight piling joints.

No matter how tough or complex your corrosion problem may be, there's a good chance a Pitt Chem engineer can find a solution with one of the durable, economical, easy-to-apply Pitt Chem Coatings. We'll be glad to have him survey your needs—without cost or obligation.

W&D 5183

PITT CHEM 101—For Severest Conditions
PITT CHEM 102—Maintenance Coating
PITT CHEM 103—General Purpose Coating
PITT CHEM 104—Potable Water Service
PITT CHEM 105 AQUATAR—A Water Dispersion
PITT CHEM 106 TARMASTIC—Sealing Mastic
PITT CHEM 107 PACHKOTE—Specialty Coating
PITT CHEM 110—Coating Sealer

PROTECTIVE COATINGS DIVISION
PITTSBURGH
COKE & CHEMICAL CO.
Grant Building • Pittsburgh 19, Pa.

COAL CHEMICALS • AGRICULTURAL CHEMICALS • FINE CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON

TO LICK the really rough ones *on schedule,* mount U. S. Royal Nylon Con-Trak-Tors on your equipment.

ALL-NYLON STRENGTH

The Con-Trak-Tor's Nylon cord carcass *won't quit* under vicious shocks and jolts. You're sure to get all the long service life built into this great tire.

TRIPLE IMPACT PROTECTION

1. *Extra rubber* between cord plies. 2. *Double shock-pads* beneath the tread. 3. *Built extra-tough at the crown* to withstand snags and rocks.

FULL LUG TRACTION

The Con-Trak-Tor's *full-width* lug design pulls you through where others bog down, won't strand you in heavy going, gives *extra* protection from side-slip.

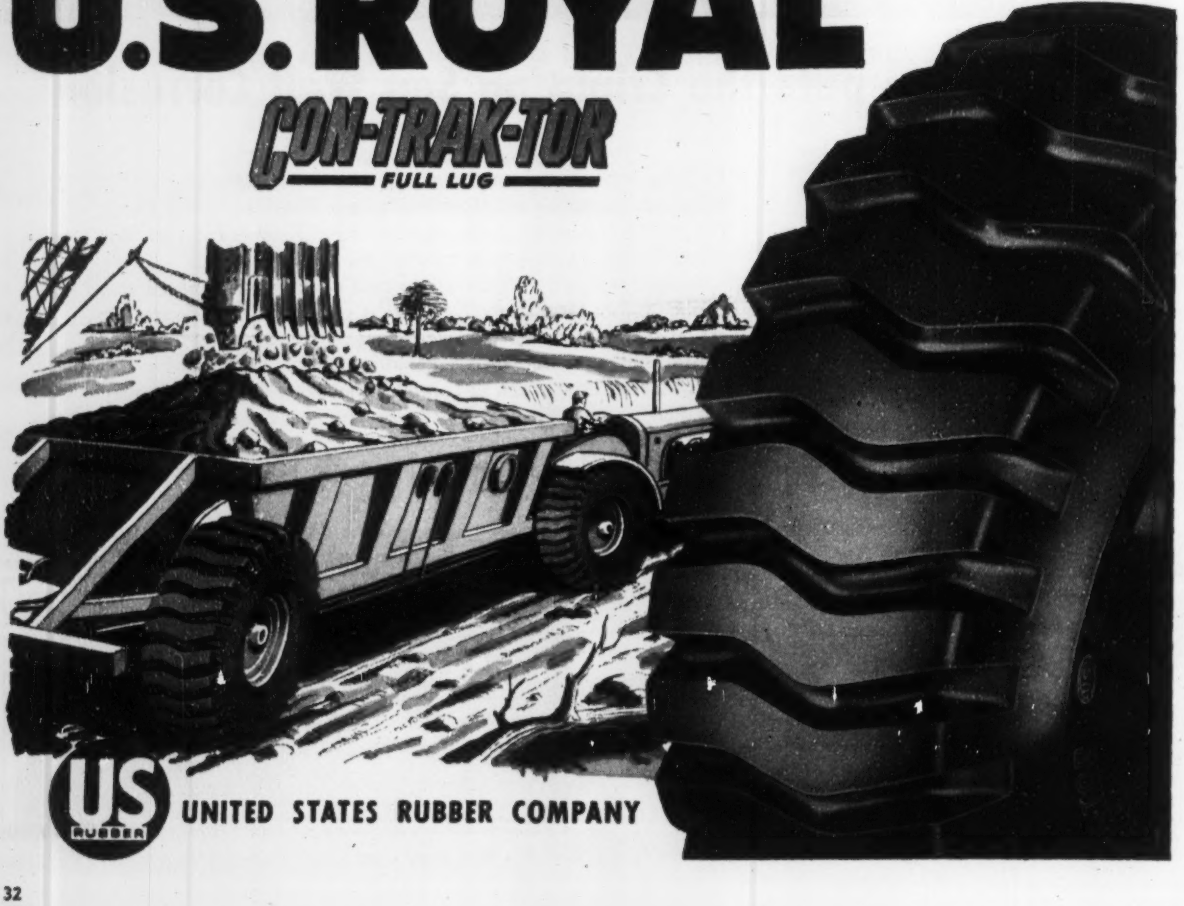
Talk the Con-Trak-Tor over with your U. S. Royal Dealer. He can equip you with the size you need for the job you want to get done!

Tough Jobs Get Done ...on NYLON!

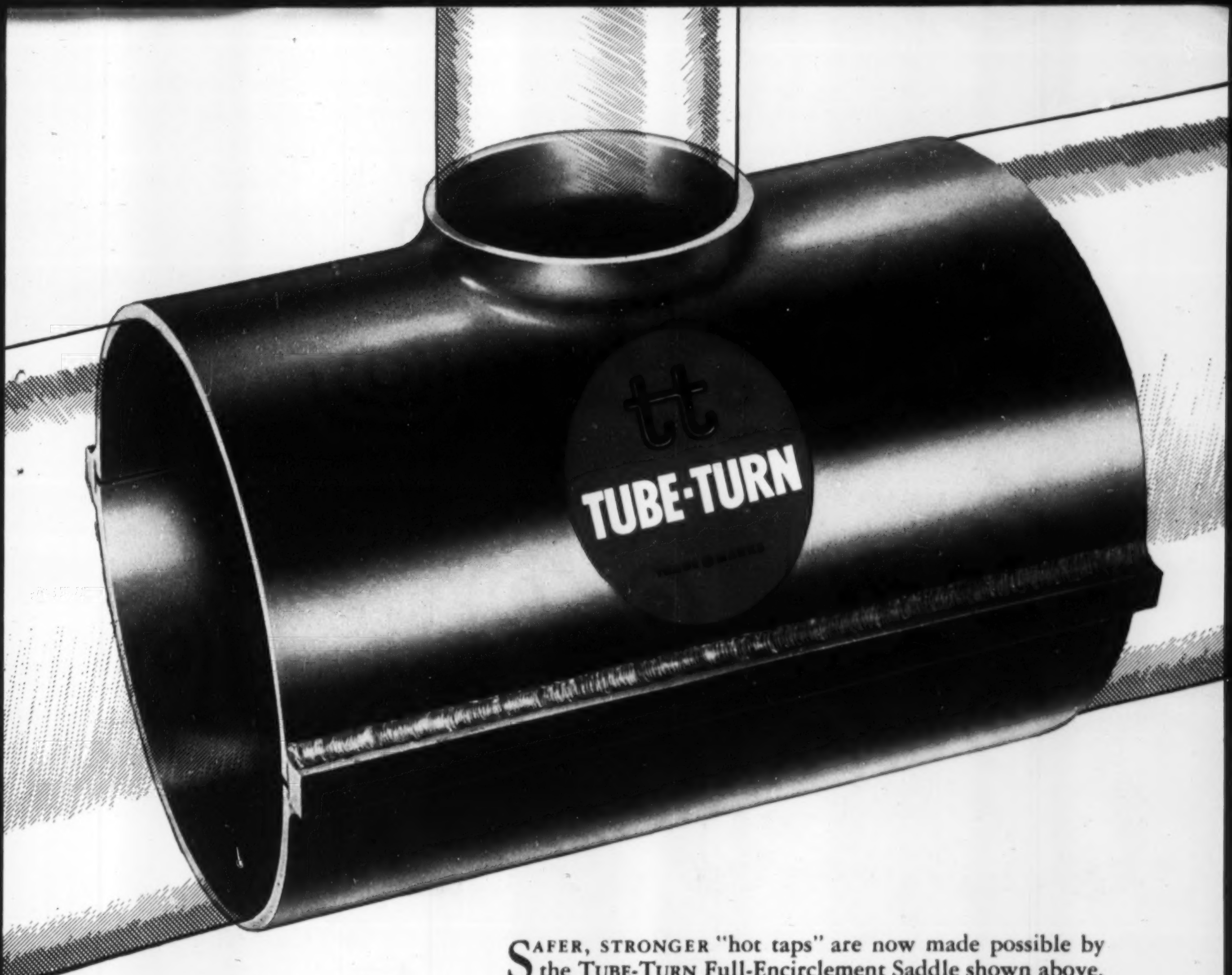
U.S. ROYAL

CON-TRAK-TOR

FULL LUG



US RUBBER **UNITED STATES RUBBER COMPANY**



NEW!

TUBE-TURN Full-Encirclement Saddle improves "hot-tapping" of piping

SAFER, STRONGER "hot taps" are now made possible by the TUBE-TURN Full-Encirclement Saddle shown above. This new product is the first of a group of important developments of Tube Turns' unique pulsation pressure testing program.

Split longitudinally on a horizontal plane, perpendicular to the axis of the outlet, this new "hot tapping" reinforcement eliminates welds in the critical crotch area. Its installation requires a minimum amount of field welding. When used with high yield strength pipe, no welds are required between saddle and line pipe.

The TUBE-TURN Full-Encirclement Saddle is designed for high yield strength thin-wall pipe and for heavy wall cylinders used for headers, bottles and pulsation dampeners. It can be supplied for pipe sizes through 42″, any outlet size, in composition and wall thickness to match service conditions.

The Leading Manufacturer of Welding Fittings and Flanges

TUBE TURNS LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Chicago • Denver • Los Angeles
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"tt" and
"TUBE-TURN"
Reg. U.S.
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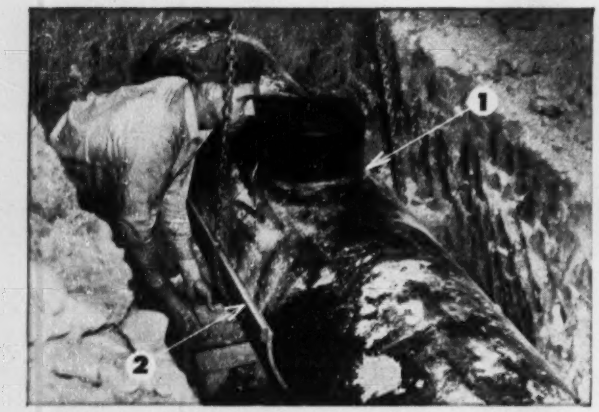
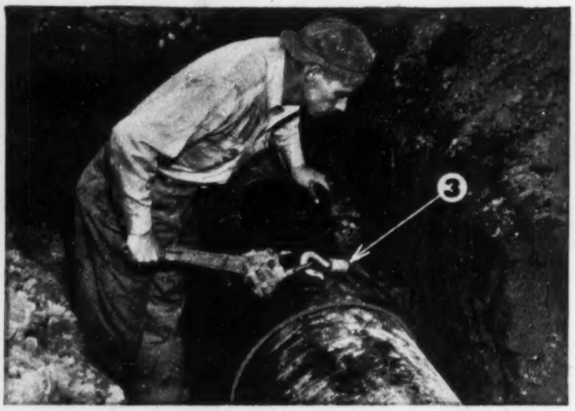
HOW INSTALLED

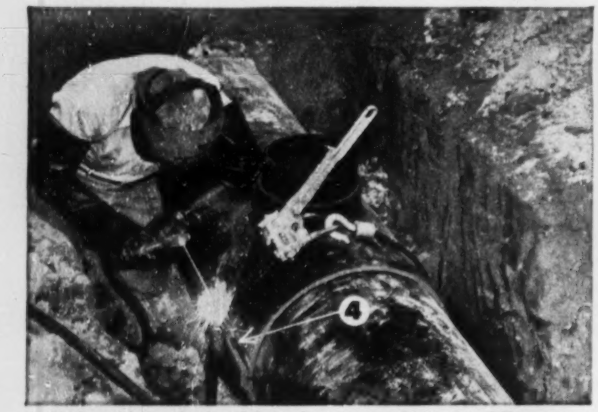
How to install the new TUBE-TURN Full-Encirclement Saddle for a "Hot Tap"



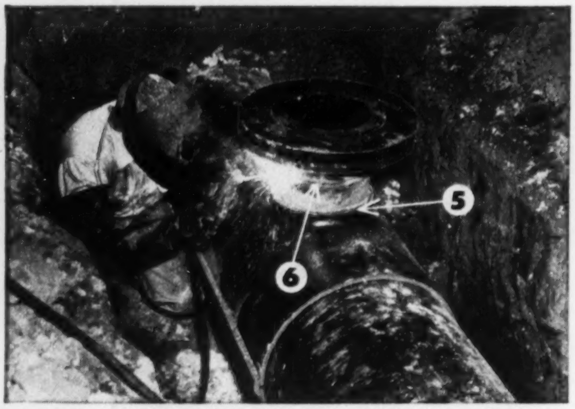
1. *Weld branch outlet pipe to run pipe according to normal procedure.*
2. *Position and block up bottom half of full-encirclement saddle.*



3. *Slip top half of full-encirclement saddle over branch outlet. Bring two halves together tightly by means of clamp such as shown.*



4. *Tack weld longitudinal lap plates to top half of saddle, remove clamp and complete welding of plates. (Plates are shop-welded to bottom half).*



5. *Fillet weld saddle outlet to branch pipe.* 6. *Join branch pipe to* TUBE-TURN *Welding Neck Flange. Normal tapping procedure follows.*

NOTE THAT when used with high yield strength, thin-wall pipe, as shown above, circumferential welds between saddle ends and run pipe are not required. This precludes possibility of failure due to underbead cracking or to local stress concentrations which exists at such attachment welds with conventional saddles or other types of "hot tap" fittings which must be fillet welded to high yield strength, thin-wall pipe. The TUBE-TURN Full-Encirclement Saddle fully meets all requirements for reinforcement of welded branch connections as developed by Section 8 of the Code for Pressure Piping.

This new, advanced design is another example of TUBE TURNS' pioneering... why it pays to do business with the leader.

tt
TUBE-TURN

TUBE TURNS LOUISVILLE 1, KENTUCKY

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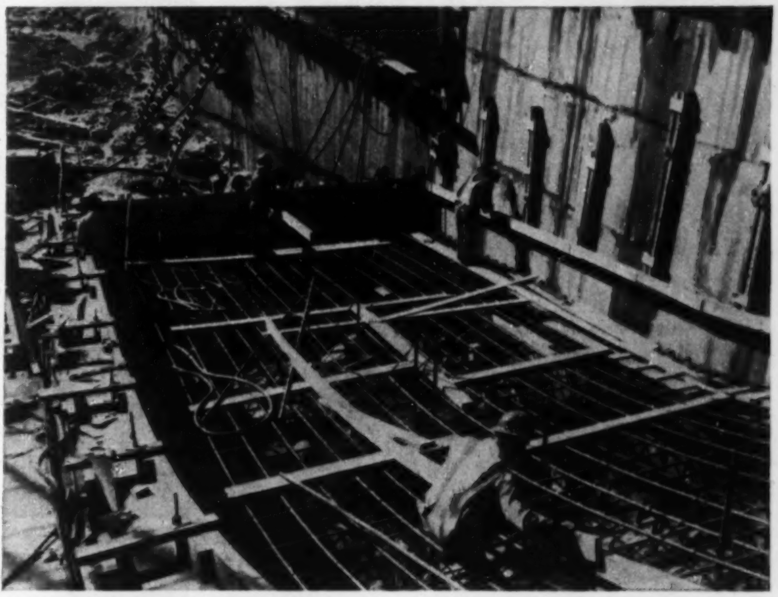
Two California Construction Projects



GIANT FOLSOM DAM

The $65 million Folsom Dam, when completed in 1955, will contain about 1,200,000 cu yd of concrete and more than 2300 tons of reinforcing bars, supplied by Bethlehem Pacific Steel Corporation. The dam will provide power and irrigation facilities, and tame floods in the Sacramento Valley. This construction picture shows Bethlehem bars in a section of the dam's stilling basin slab, just prior to pouring. The bars are on 12-in. centers in one layer. Merritt-Chapman & Scott Corp. and the Savin Construction Corp. hold the contract for the concrete spillway section of the main dam, its wing dams of compacted-earth fill, and several saddle dikes.

NEW DEPARTMENT STORE

Construction of the basement and first floor slabs of Macy's new department store at San Mateo, part of the proposed $30 million Hillsdale Shopping Center, is shown in the photograph at the left. Over 1200 tons of reinforcing bars, supplied by Bethlehem Pacific Coast Steel Corporation, are being used in the building. When completed, the 3-story store, costing about $6 million, will have a total floor area of 200,000 sq ft. Architect: Welton Becket and Associates, San Francisco. General Contractor: Haas and Haynie, also of San Francisco.

No matter where your construction project is — West Coast, East Coast, or in between — Bethlehem can deliver your bars to the job-site with no delays to your construction schedule. And our bar-fabricating shops, conveniently located throughout the country, will prepare placing plans, cut to length, bend, bundle and tag and deliver ready for placement as your job schedule requires.

Bethlehem Bars are made from new-billet steel to ASTM Specification A-15 and with deformations which meet ASTM Specification A-305.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

BETHLEHEM PACIFIC COAST
STEEL CORPORATION
SAN FRANCISCO 19, CALIF.

BETHLEHEM STEEL EXPORT
CORPORATION
NEW YORK 4, N. Y.

BETHLEHEM BAR FABRICATING SHOPS

BOSTON • NEW YORK • PHILADELPHIA • JOHNSTOWN, PA. • BALTIMORE • SEATTLE
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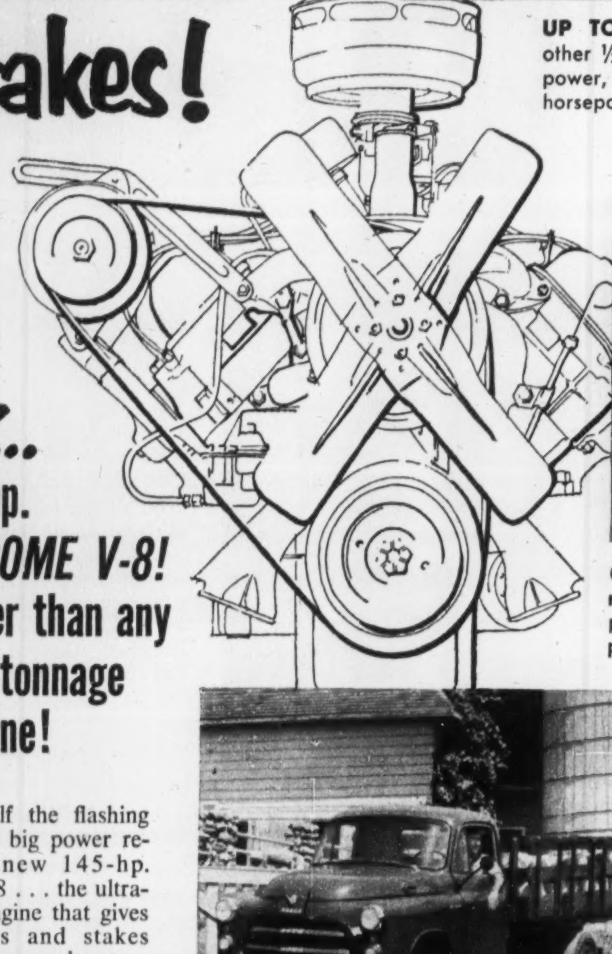
BETHLEHEM REINFORCING BARS

BETHLEHEM STEEL

World's most powerful pick-ups, panels and stakes!

UP TO 39.4% MORE POWER than other ½-, ¾-, and 1-ton trucks. It's low-cost power, too! Dodge V-8 pick-ups offer most horsepower for your truck dollar.



Now... new 145-hp. *POWER-DOME V-8!* More power than any other low-tonnage truck engine!

Test for yourself the flashing acceleration, the big power reserve of this new 145-hp. Power-Dome V-8 . . . the ultra-modern truck engine that gives Dodge pick-ups and stakes *more power than any low-tonnage truck!* Ask your dependable Dodge truck dealer to show you a new Power-Dome V-8 or a 110-hp. thrifty six!

OFFERS MORE MILES PER GALLON on regular gas—most hp. per cu. in. displacement of any popular truck engine—prove new Power-Dome V-8's economy.

"NEW-TRUCK" POWER LASTS LONGER: Power-Dome design . . . proved in higher tonnage models . . . means fewer power-stealing "hot spots" in combustion chambers.

***More proof* that Dodge trucks offer a better deal for the man at the wheel!**

DODGE "Job-Rated" TRUCKS

now...

for the first time...

A PRACTICAL

outdoor fluorescent

LUMINAIRE & STANDARD

Again, P & K leads the way with a great new development introducing a new era in highway, street, and area lighting. With these new P & K engineered fluorescent luminaires, *available as a complete package with companion-designed P & K Aluminum Standards,* any outdoor lighting facility can achieve new highs in performance, versatility and appearance . . . at new all-time lows in cost!

HOW YOUR LIGHTING CAN BENEFIT WITH P & K FLUORESCENT LUMINAIRES

- HIGHEST LIGHT LEVELS WITHOUT GLARE OR PHYSICAL BULK
- ADJUSTABLE LIGHT DISTRIBUTION FOR ON-THE-SPOT REQUIREMENTS
- LOW COSTS, INCLUDING PURCHASE, INSTALLATION, OPERATION AND MAINTENANCE
- PLEASANT, GLARE-FREE LIGHT IN ANY WEATHER
- NORMAL COLOR DIFFERENTIATION IMPROVES VISIBILITY
- CLEAN, MODERN DESIGN
- MODELS FOR ALL LIGHTING NEEDS
- ADAPTABLE TO EXISTING INSTALLATIONS

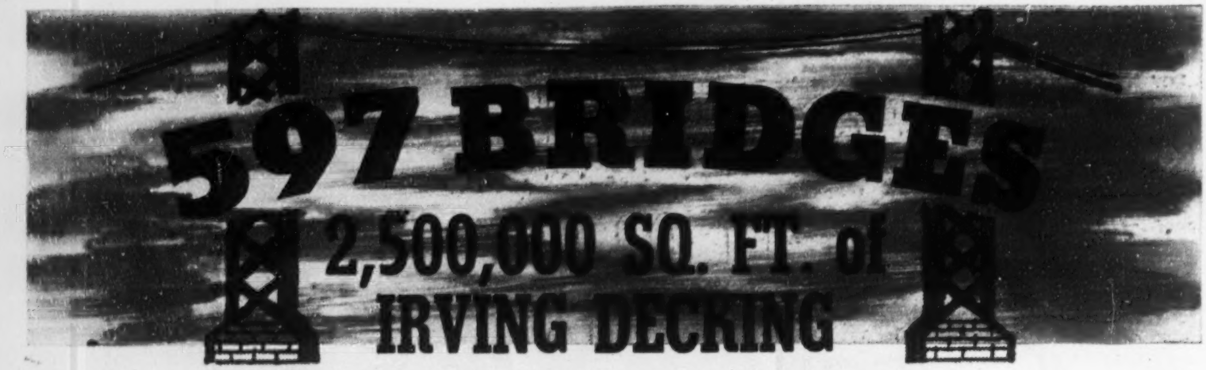
ENGINEERS AND OFFICIALS CONCERNED WITH OUTDOOR LIGHTING ARE INVITED TO WRITE FOR FULL INFORMATION.

P&K

FOR HIGHWAY, STREET AND AREA LIGHTING

Pfaff & Kendall

84 Foundry Street
Newark 5, New Jersey



597 BRIDGES
2,500,000 SQ. FT. of IRVING DECKING

Emphasize the Engineering Advantages of Irving Bridge Decking.

IRVING DECKING is 80% open, self-cleaning and self-draining, non-floating, not affected by wind pressure, lightweight, strong, safe, practically self-maintaining.

ONLY IRVING OFFERS you over 50 years of experience in quality production and sound application of open mesh metal flooring. Take advantage of it! Write for new engineering data catalog covering all fields of application.

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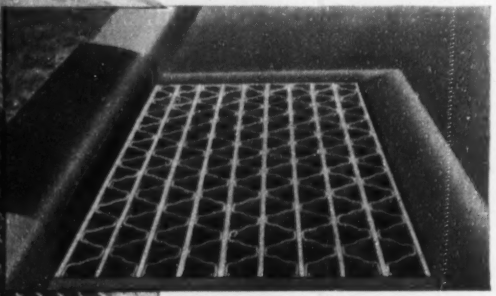
Manufacturers of Riveted, Pressure-Locked, and Welded Gratings.

Sidewalk Grating for Bridges, Gutter Catch Basin Covers, Armourings for Heavy Duty Floors, Trucking Aisles, Loading Platforms, Boiler Room and Plant Flooring, Catwalks, Runways, Stair Treads, Sidewalk Grating, Tree Guards, Balcony Flooring, Airfield Landing Mats.



IRVING "DRYWAY" DRAINGRATES
are
simple to install,
easy and inexpensive
to maintain.
These safe, clean and
strong drain covers
are available in
Rectangular Mesh
and Riveted Types.

IRVING SUBWAY GRATING CO. INC.

ESTABLISHED 1902

OFFICES and PLANTS at

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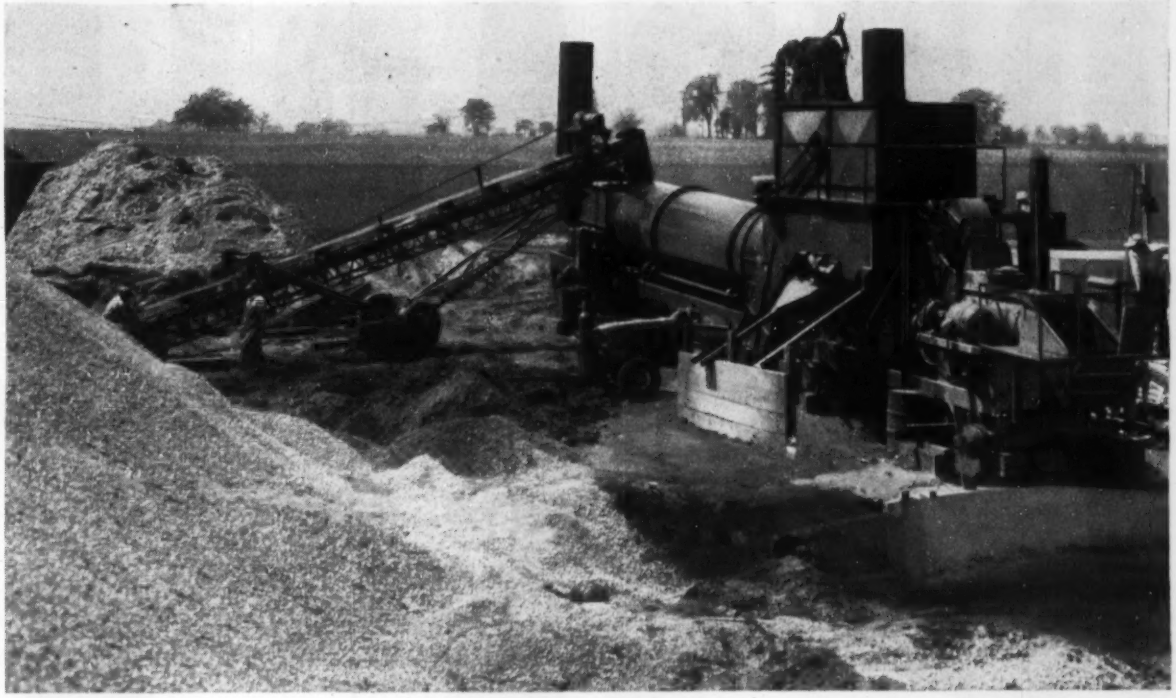

Why the new "81" Bituminous Plant will let you underbid your competitors

● Portability and Performance. There's the answer.

First let's consider portability. The 81 consists of two main units, each complete on its own pneumatic-tired chassis, ready to pull in or pull out at a minute's notice. No holes to dig, no special alignment necessary. Just pull in, hook up, lay pipes, and go to work.

Those plant-hours and man-hours you'll save on each move count up *fast* in dollars and cents.

Continuous, non-stop flow

Now let's examine performance. The steady, uniform, uninterrupted flow of material from the 81 keeps your trucks busy. You vary the mix by remote control of the bitumen pump or by adjusting the gates on the aggregate feeder without stopping the plant. Clam gates on the discharge hopper load your trucks without segregation, cutting off the flow when trucks pull in and out—again without slowing the plant. This famous *Continuflo* operation gives you more yards a day . . . *low cost* yards, too.

All mixing is fully automatic, for the asphalt metering pump is interlocked with the aggregate feeder to *guarantee* exact proportioning. There can be no variation. The human element is out, and correct proportioning is certain.

Other features

Other important PIONEER features include an auxiliary air inlet in the drier to provide extra air to carry off excess moisture . . . 90% efficient multiclone dust collector . . . premix chamber where hot, dry aggregates are mixed *before* bitumen is added . . . heavily insulated bitumen tank which cuts heat loss . . . patented anti-caking pugmill . . . and central location of all gauges, indicators, and control lever to permit control of entire mixer unit from a single platform. The entire plant is driven by electric motors with central-station push-button control.

Stout construction—quality fittings

Certainly, the extra heavy welded construction and use of the best pumps, bearings, and fittings obtainable have added a little to the manufacturing costs, but the next time you seek a blacktop job, just consider the 81 . . . and how it will let you turn in a lower bid.

Want details? Write Pioneer Engineering Works, Inc., Minneapolis (subsidiary of Poor & Company, Chicago) or nearest PIONEER Distributor.

	MODEL 51	MODEL 81	MODEL 101
First Unit	Mixer and gradation screen with 3-compartment bin	Mixer and gradation screen with 3-compartment bin	Mixer and gradation screen with 3-compartment bin
Second Unit	Drier, dust collector and burner	Drier, dust collector and burner	Drier
Third Unit	—	—	Dust collector
Auxiliary Units	Feeder elevator (with necessary feeder), hot elevator and fines feeder (if desired)	Feeder conveyor (with necessary feeder), hot elevator and fines feeder (if desired)	Feeder conveyor (with necessary feeder), hot elevator, burner and fines feeder (if desired)
Rated Cap.	40-60 yds./hr.	60-80 yds./hr.	80-110 yds./hr.
Total Wt. (Approx.)	68,000 lbs.	86,500 lbs.	125,000 lbs.
Approx. HP Req. (Elec.)	100	143	200

Pioneer
Continuflo EQUIPMENT

Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn.
Subsidiary of Poor & Company • Chicago
Please send information on equipment checked.

☐ GRAVEL PLANTS
☐ ROCK PLANTS
☐ JAW CRUSHERS
☐ ROLL CRUSHERS
☐ WASHING PLANTS
☐ BITUMINOUS PLANTS
☐ APRON FEEDERS
☐ ORO FEEDERS
☐ MECHANICAL FEEDERS
☐ VIBRATING SCREENS
☐ BUZZER SCREENS (LIGHT DUTY)
☐ CONTINUFLO CONVEYORS

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*City*__________ *Zone*___ *State*__________

DURABLE

"CENTURY"® PIPE

is made of asbestos fiber and portland cement—two almost indestructible materials that have been known to endure ever since antiquity. And this quality of durability means extra long life. And *that* means money saved.

Consider the many other distinct advantages of "Century" pipe and you'll see why more and more thrifty towns are choosing it—why it's the wise choice for your community, too.

Write for further information now.

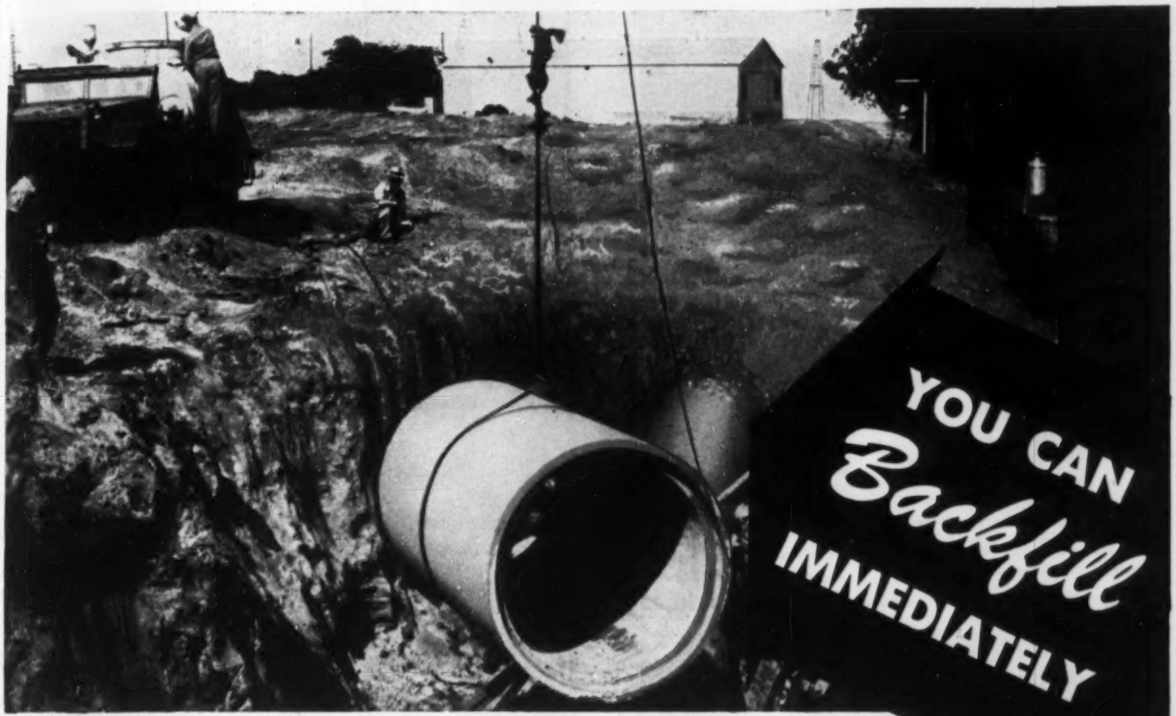
QUALITIES THAT MAKE "CENTURY" PIPE ECONOMICAL, TROUBLE-FREE, LONG-LIVED

1. NON-TUBERCULATING
2. NON-CORROSIVE
3. EXCEPTIONALLY STRONG
4. DURABLE
5. IMMUNE TO ELECTROLYSIS
6. TIGHT JOINTS
7. SMOOTH BORE
8. LIGHT WEIGHT
9. EASILY, QUICKLY LAID
10. LOW COST

KEASBEY & MATTISON COMPANY • AMBLER • PENNSYLVANIA

Nature made asbestos . . . Keasbey & Mattison has made it serve mankind since 1873

K&M best in asbestos ®



WHEN YOU INSTALL

TYLOX *flexible rubber* PIPE JOINT

When sewer and drain pipe is jointed with properly installed Tylox Rubber Gaskets, *backfilling can proceed as rapidly as the pipe is laid.*

Flexible Tylox Gaskets compensate for angularities in the line, permitting contractors to eliminate the time interval ordinarily allowed for bituminous or mortar joints to "set" in tongue-and-groove or bell-and-spigot pipe projects.

Since there's no adhesion factor—Tylox joints seal mechanically—it's not necessary to protect the line from shock or backfill loads . . . or even from muddy trench conditions. When the pipe is shoved home, the Tylox Gasket "packs" the joint's annular space under *compression.* The natural resilience of the rubber *keeps* the joint tight. Neither immediate backfill, nor presence of water in the trench affects the seal.

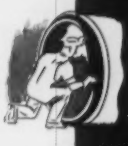
Tylox is made of a specially compounded rubber which resists sewage and industrial waste acids and alkalies, and is virtually ageless. Under ground, and under compression, it outlasts the pipe. It can never shrink or crumble, to leave crevices in the joint for entrance of roots or ground water.

When planning your next sewerage or drainage project, specify Tylox jointing gaskets to speed pipe jointing, eliminate backfilling delays, and to assure a line that is "leakproof for life."

Write today for complete specification data and literature on TYLOX Pipe Jointing Gaskets.

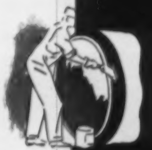
MAKING JOINTS W
TYLOX RUBBER GA
IS AS SIMPLE A

A



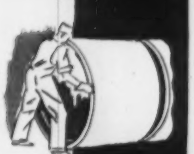
Cement tongue and snap on TYLOX gasket.

B



Lubricate sliding surfaces with TYLOX cement.

C

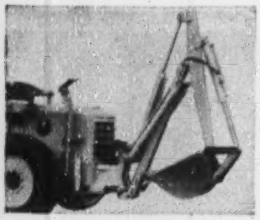


Shove the pipe home to line and grade.

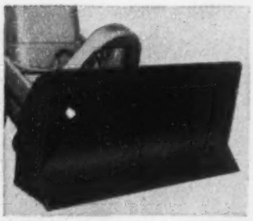
HAMILTON KENT MANUFACTURING COMPA

427 W. Grant St. KENT, OHIO ORchard 3-

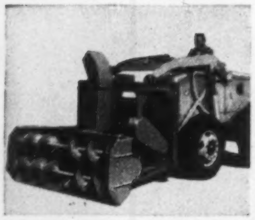
1788



Back Hoe makes a "PAYLOADER" a double-duty digger.

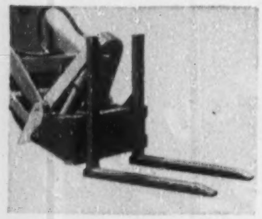


Backfill Blade is available for most "PAYLOADER" sizes.

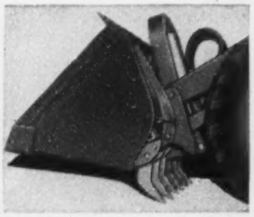


Rotary Plow has its own engine — loads or throws snow.

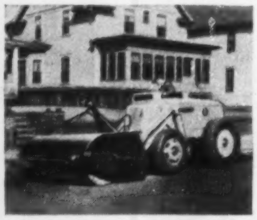
Operator Cabs for greater comfort, winter or summer.



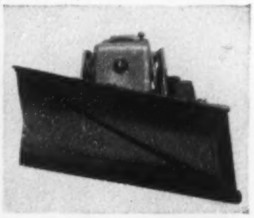
Fork Lift has adjustable fork-spacing for many unit loads.



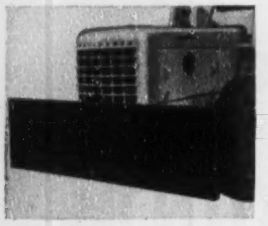
Scarifier loosens tough soil for faster, easier handling.



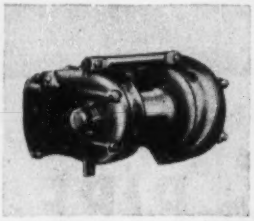
Pick-up Street Sweeper attaches on bucket — dumps its loads into trucks.



Blade Plows are available — both rigid and reversible, trip blade types.



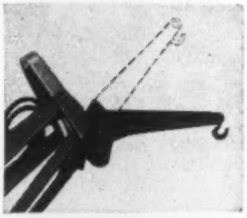
Pusher Plate — a convenient attachment to spot cars.



Winch for rear-end mounting — for hoisting and hard-to-reach pulls.

Land Clearing Blade for digging out boulders, brush, stumps.

4-wheel-drive "PAYLOADER" models, with V plow are proven snow fighters for both country and city highways . . . have power to handle heavy snows . . . maneuverability for fast alley-clearing.



Crane Hook quickly mounted to handle pipe, bars, timbers, etc.

"in season"

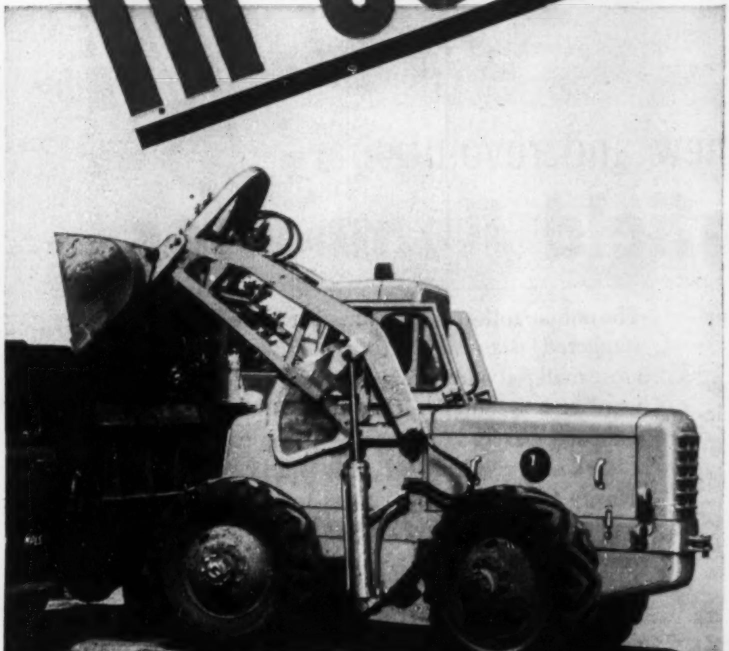
PAYLOADER

tractor shovels work for you the whole year through

When you buy a standard "PAYLOADER" you're investing in a machine so versatile that you can use it 12 months of the year — that can dig, grade, spread, pile and load dirt . . . that can handle materials and load snow.

In addition a variety of special buckets, attachments and accessories are available so you can use your "PAYLOADER" for more and special jobs.

For information on the complete, proven "PAYLOADER" line plus ALL the special equipment available, see your Hough Distributor, or write The Frank G. Hough Co.



PAYLOADER®
THE FRANK G. HOUGH CO. • LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

Standard buckets can be used to load dirt or snow, but special larger buckets are also available for snow-handling.

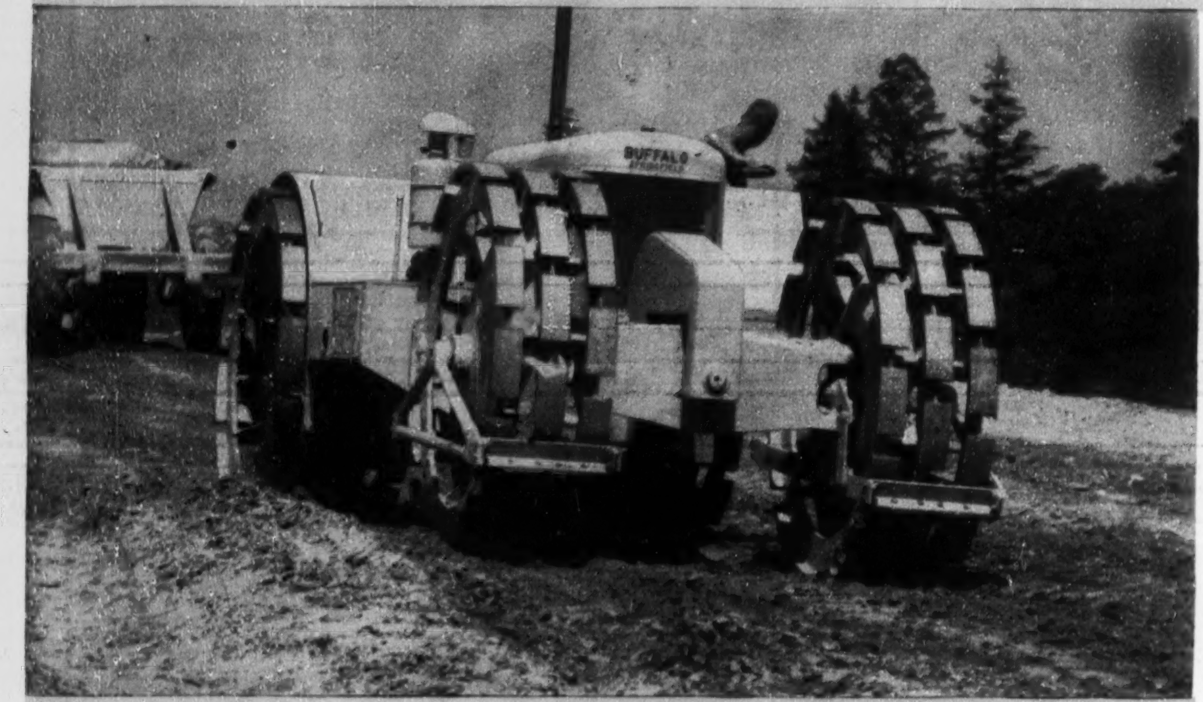
THE FRANK G. HOUGH CO.
[illegible]

Please send me more "PAYLOADER" information.

NAME ....
TITLE ....
COMPANY ....
STREET ....
CITY .... STATE ....

☐ have distributor call
☐ send information on all seven models
☐ send information on all attachments.

You've never before seen Compaction like this!



Announcing the new and revolutionary

Buffalo-Springfield Kompactor

What do we mean by "new"? There's *never* been anything like it before!

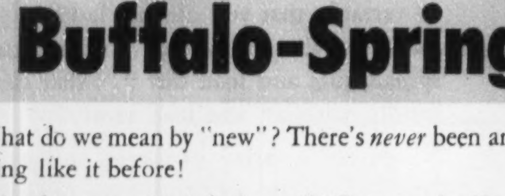
Why do we say "revolutionary"? Because the Kompactor is changing *drastically* the time and cost elements in soil compaction jobs!

Here are the spectacular results of tests in the field:

> ***The Kompactor has met density requirements in one fourth the number of passes required with large sheepsfoot, vibrating, or heavy pneumatic-tired rollers. One contractor reports a cost savings of 50% on an embankment job!***

The Kompactor is self-propelled, reversible, and easy to maneuver on steep embankments, can work in close to abutments, culverts, etc.

There's a Buffalo-Springfield Distributor conveniently located to serve you.



The unique rolls of the Kompactor are *segmented.* The staggered "islands" that form the rolling surface enter loose material with minimum displacement, either forward or horizontally. They leave without disturbing compacted areas in any way. All compaction effort is *downward,* resulting in greater and more uniform density from lower elevations to top surface. As a result, *two passes with the Kompactor will often meet density requirements!*

Before you bid another soil compaction job, find out more about the Buffalo-Springfield Kompactor. It may completely change your time and cost picture, give you a clear-cut advantage in bidding those close jobs!

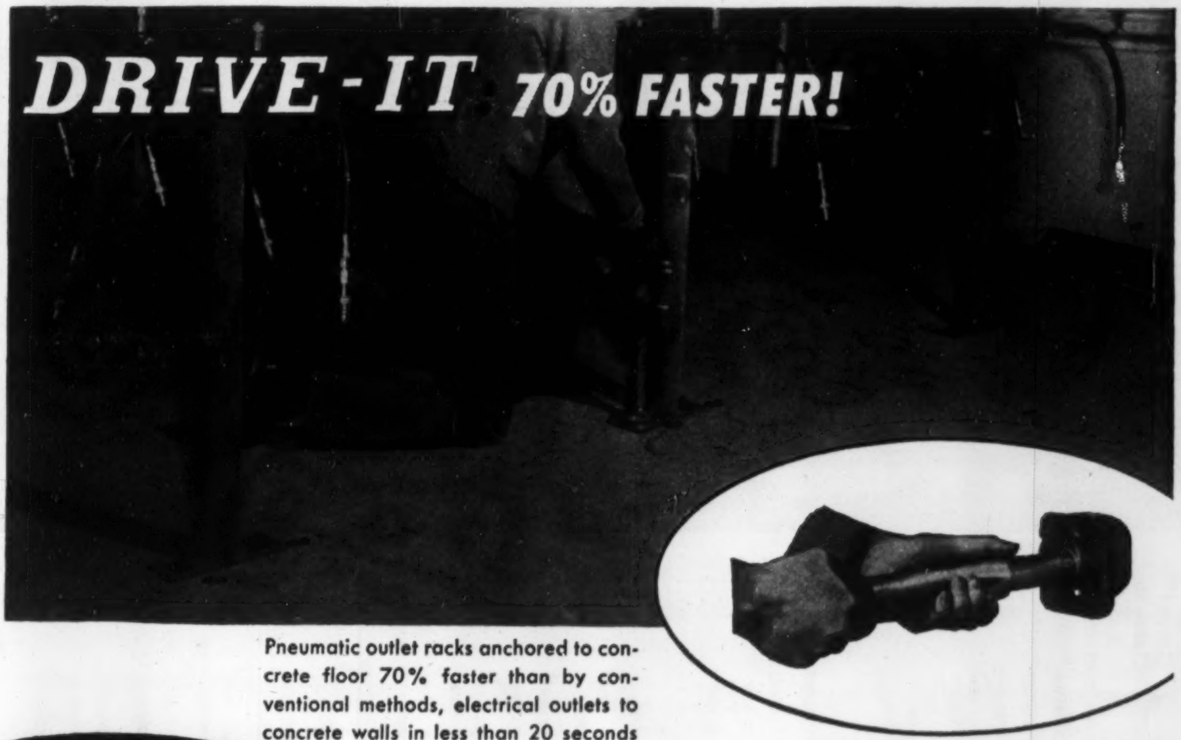
Write today for full information.

The Buffalo-Springfield Roller Co.
Springfield, Ohio

BUFFALO THE STANDARD OF COMPARISON **SPRINGFIELD**
SPRINGFIELD, OHIO

THE LEADER IN ROAD ROLLER DESIGN AND MANUFACTURE.

DRIVE-IT 70% FASTER!

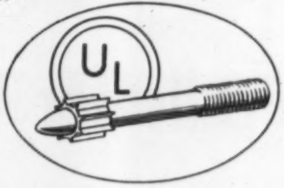


Pneumatic outlet racks anchored to concrete floor 70% faster than by conventional methods, electrical outlets to concrete walls in less than 20 seconds per bolt.

NEW EXCLUSIVE

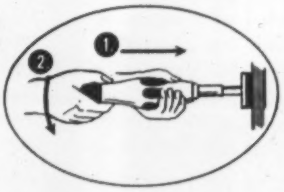
DRIVE-IT 320
WITH
BREAK-OPEN ACTION

Snap open action results in the fastest operating tool on the market. Easiest method to load and eject cartridges under any condition.



Drive pins are Underwriters' Laboratories approved.

Controlled Power. First and only tool which requires but one standard power load regardless of penetration desired. No need to buy and stock various strength power loads.



Three-way Safety. Cannot be discharged accidentally, due to the push and turn firing sequence. This, plus the large, swivel safety pad, makes DRIVE-IT triple safe.

More fastenings per hour with this speedy way of loading and ejecting cartridges.

DRIVE-IT
the original POWDER-ACTUATED TOOL

SEND THIS COUPON FOR FULL DETAILS

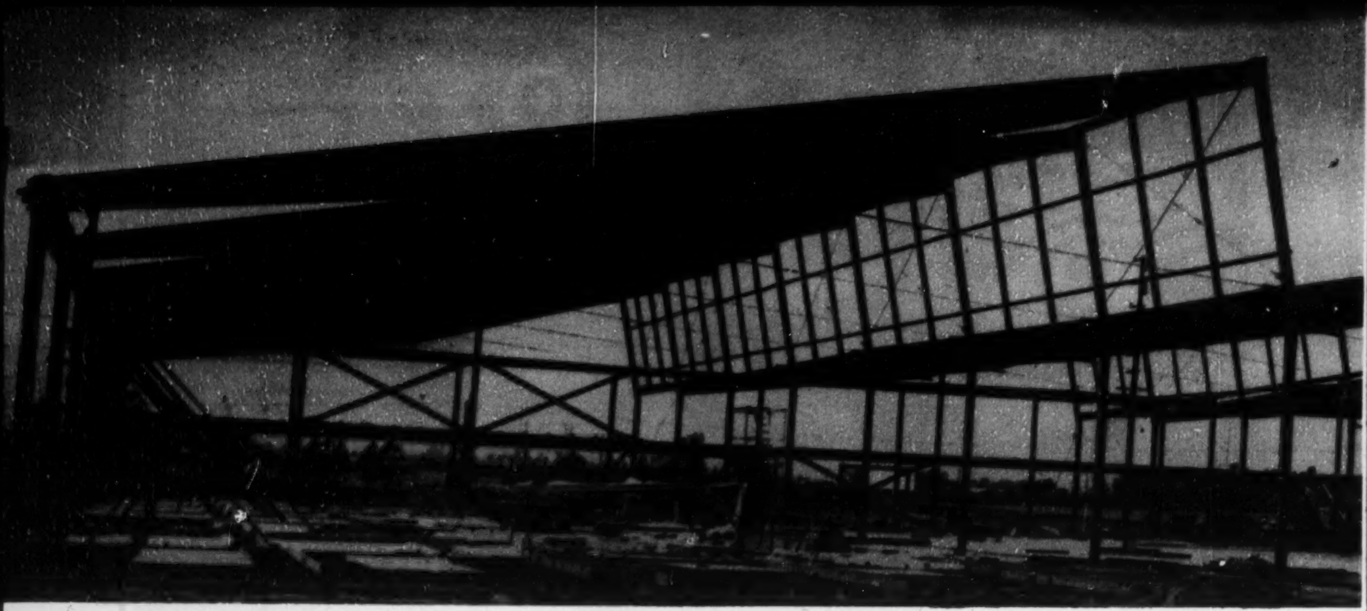
POWDER POWER TOOL CORP.
Dept. I, 7526 S.W. Macadam Ave., Portland 1, Ore.
Canada: Ammo Power Tool Co., Ltd.
735 Broadway, Vancouver, B. C.

☐ Please send FREE catalogue and literature.
☐ I want a FREE demonstration of *DRIVE-IT*.

Name____________________

Street____________________

City____________ State________



"Hurry-up construction"

at lowest cost calls for USS Structural Steel

The company: **Minneapolis-Honeywell Regulator Co., Los Angeles.**

The problem: **Not enough space (frequently heard nowadays). Another building needed in a hurry.**

The answer: **A new, expandable machine shop with plenty of natural light, a shop that's economical and easy to maintain.**

● The structural design chosen consisted of a series of 30′ x 60′ bays, the roof framing of which was composed of tapered-steel girders and open-web joists. Using this economical design coupled with the use of USS Structural Steel, the builders were able to obtain 30′ x 60′ bays at very little more than 20′ x 40′ bays would have cost had some other design or material been used. Among others considered, but eliminated due to prohibitive cost, were welded north-light rigid-frame gable bents, 60′ steel trusses, precast-concrete bents, and prestressed concrete beams.

U.S. Steel's Consolidated-Western Division of Los Angeles contracted to have the steel frame ready for installation of walls and roofs within 43 working days after receipt of approved blueprints. This included making shop detail drawings, shop fabrication, painting and erecting the steel. The frame was ready four days ahead of schedule.

Structural Steel is the most economical of load-carrying materials. Yet, it is the strongest. It will withstand more abuse than other structural materials—effectively resisting tension, torsion, compression and shear. Enclosed in buildings, it will last indefinitely—requiring no maintenance. Equally adaptable to riveting, welding, or bolting, Structural Steel can be erected in any weather in which men can work. And since steel members are fabricated indoors, weather can have no effect on the quality of workmanship.

For further information on construction with steel, write to the United States Steel Corporation, 525 William Penn Place, Room 4497, Pittsburgh 30, Pa.

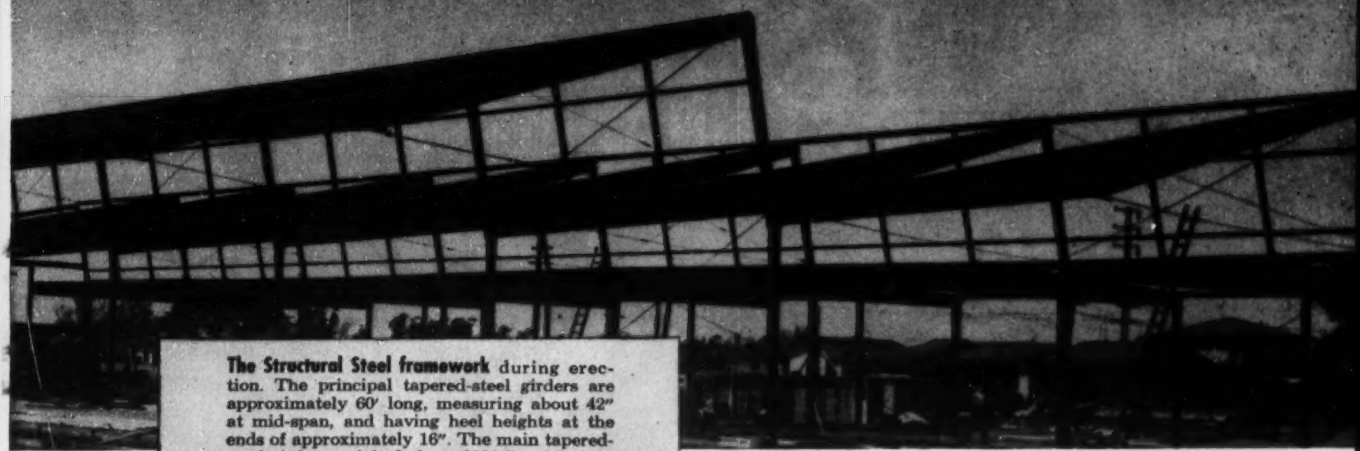
ARCHITECTS . . . ENGINEERS The Structural Steel you need is available—NOW! No waiting is necessary. Place your order and prompt delivery is assured.

UNITED STATES STEEL CORPORATION, PITTSBURGH · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

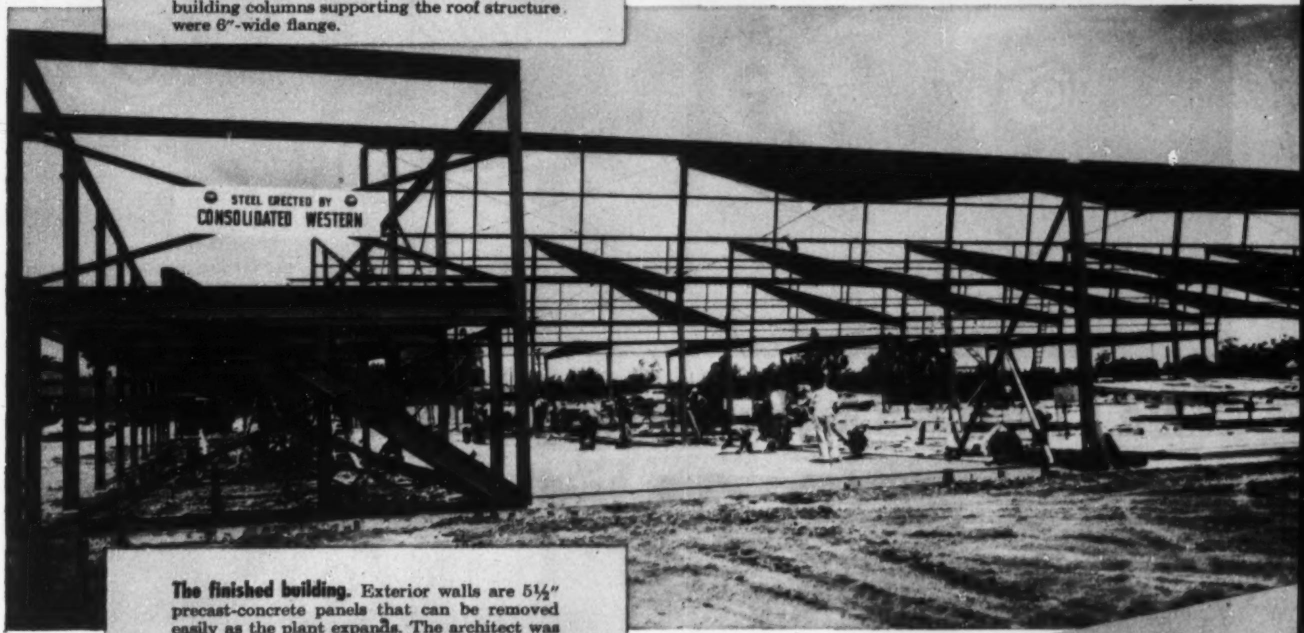
USS STRUCTURAL STEEL

USS

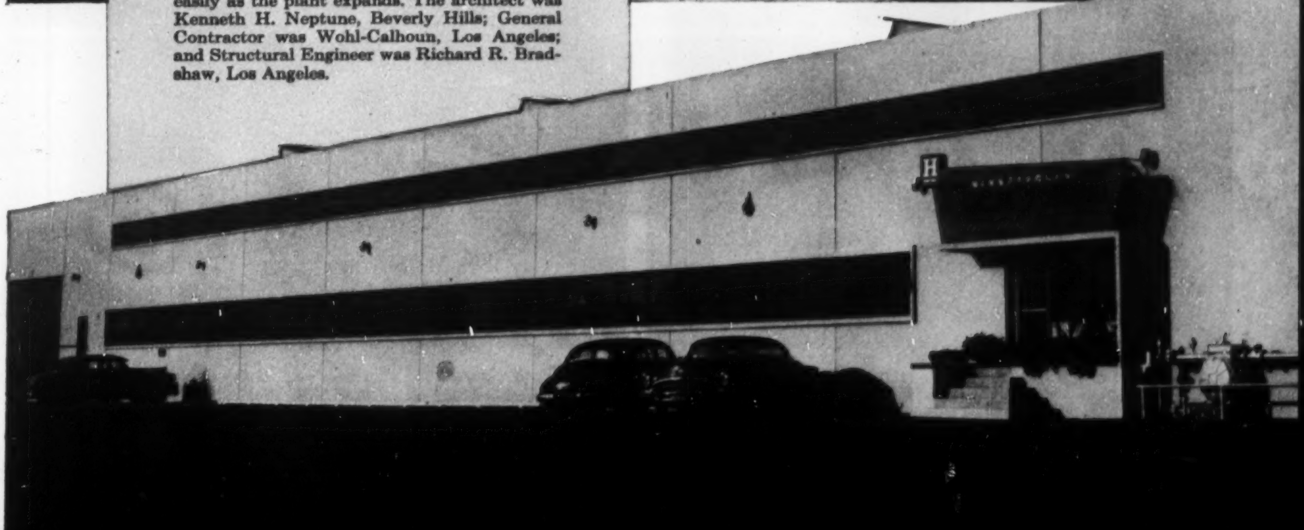
UNITED STATES STEEL



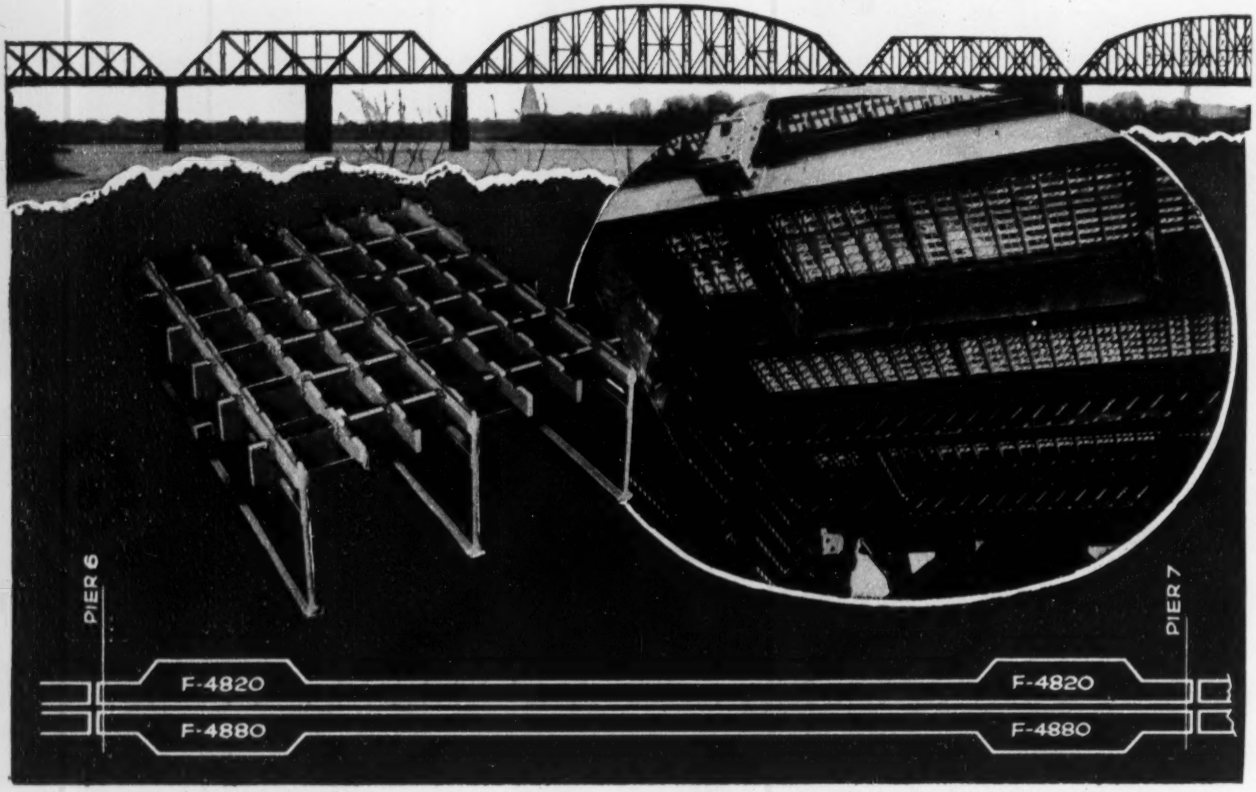
The Structural Steel framework during erection. The principal tapered-steel girders are approximately 60′ long, measuring about 42″ at mid-span, and having heel heights at the ends of approximately 16″. The main tapered-steel girders weighed about 3000 lbs. All main building columns supporting the roof structure were 6″-wide flange.



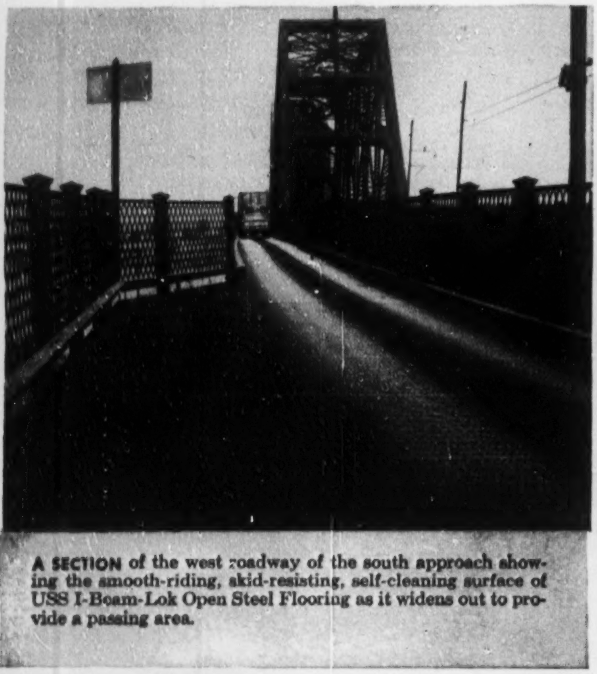
The finished building. Exterior walls are 5½″ precast-concrete panels that can be removed easily as the plant expands. The architect was Kenneth H. Neptune, Beverly Hills; General Contractor was Wohl-Calhoun, Los Angeles; and Structural Engineer was Richard R. Bradshaw, Los Angeles.



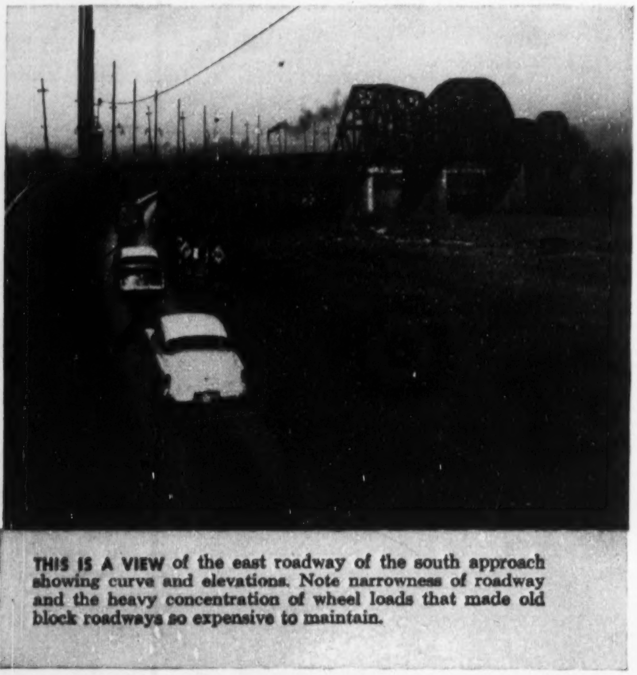
Another costly maintenance problem



K & I Terminal R R Company replaces troublesome roadways

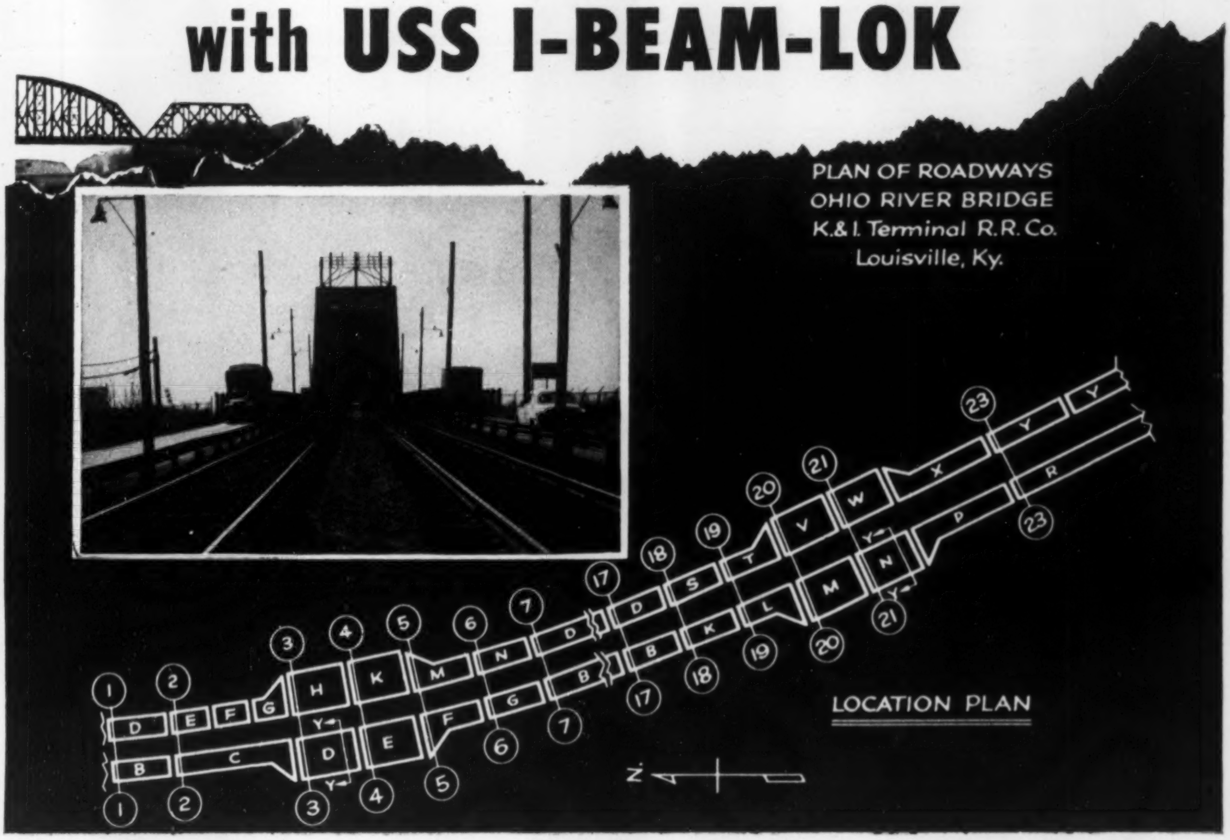


A SECTION of the west roadway of the south approach showing the smooth-riding, skid-resisting, self-cleaning surface of USS I-Beam-Lok Open Steel Flooring as it widens out to provide a passing area.



THIS IS A VIEW of the east roadway of the south approach showing curve and elevations. Note narrowness of roadway and the heavy concentration of wheel loads that made old block roadways so expensive to maintain.

solved by reflooring old bridge with USS I-BEAM-LOK



PLAN OF ROADWAYS
OHIO RIVER BRIDGE
K.& I. Terminal R.R. Co.
Louisville, Ky.

LOCATION PLAN

on Ohio River bridge with modern open steel flooring

• Another important old bridge has taken a new lease on life. And what a welcome relief to its owners, the Kentucky and Indiana Terminal Railroad Company, who had the costly problem of maintaining the obsolete laminated wood deck and asphalt surfaced roadways!

Neither the original 3½″ x 9″ wood block flooring on the present bridge which was completed in 1913, nor the still heavier floor which replaced it were adequate for the traffic of the times. So, in 1949, finally fed up with the endless problem of trying to maintain the troublesome old flooring, the owners experimented with an open type steel deck on 120 feet of roadway.

The results were so satisfactory, that in 1951 USS I-Beam-Lok was used on the east roadway of the south approach. In 1952, USS I-Beam-Lok was laid on the east roadway of the bridge proper. And in 1953, the entire west roadway was refloored with USS I-Beam-Lok.

In all, 1,708,000 pounds of 5″ USS I-Beam-Lok Open Steel Flooring was used to cover the two 11′ x 4098′ roadways of the approaches and bridge. All work was done at night, and without interruption of traffic!

By using 5″ open steel flooring, which weighs 18.8 pounds psf as against 60 pounds psf for the old flooring, it was possible to save approximately 3,739,820 pounds in the weight of the floor.

USS I-Beam-Lok Open Steel Flooring is available in units measuring 6′2″ in width and up to 49′ in length. In many cases it can be applied directly to stringers on spans up to 4′ centers to permit H-20 loadings without secondary supports. It can be erected easily and speedily on reflooring projects such as this with a minimum interruption of traffic.

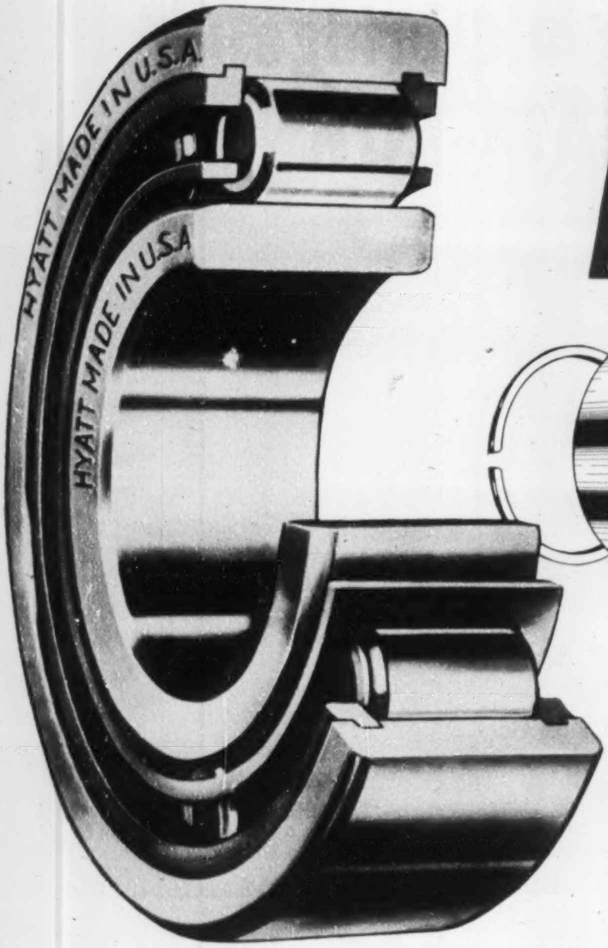
For more information about this modern lightweight open steel flooring (USS I-Beam-Lok is also available in concrete-filled type), contact the sales office nearest you.

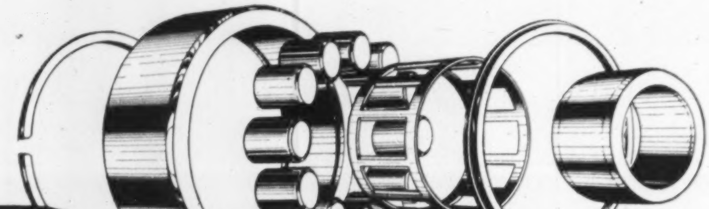
UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

UNITED STATES STEEL

A-TS





**one of many
Hyatt bearings
offering capacity—
separability—
long life**

The Hyatt A-TS Bearing is one of five basic Hy-Load types featuring a separable inner race.

Like all Hy-Loads, the A-TS is built with cylindrical rollers, so that it offers highest capacity for radial loads, plus the long, troublefree service assured by Hyatt's precision manufacture. But beyond that, this particular Hy-Load type offers the design advantages of interchangeable separable components.

With inner races removed, bearings of this type may be applied with rollers operating directly upon the surface of a suitably hardened shaft. This permits the use of larger-diameter shafts or smaller-size bearings, resulting in greater shaft rigidity or a saving in the cost of the bearing.

If you aren't already profiting through the use of Hyatt Hy-Load Bearings, contact a Hyatt sales-engineer or write today for our Catalog No. 150.

HYATT **ROLLER BEARINGS**

STRAIGHT BARREL TAPER

HYATT BEARINGS DIVISION • GENERAL MOTORS CORPORATION • HARRISON, NEW JERSEY

Charles Brongo, one of the owners, finds D Tournapulls' 12′8″ turn radius and instant electric controls especially useful in close quarters. He says, "There's not much work involved in operating the D Tournapull. With the short turn, it's easy to get around homes where other rigs can't go. And Tournapulls are easy to drive from job-to-job."

50 subdivisions leveled yearly with two 7-yd. scrapers...

With 50 to 60 subdivision and other leveling jobs to do per year, Lyell Construction Company of Spencerport, New York, needs highly-productive, highly-mobile dirtmoving equipment. Their 2 D Tournapulls fill the bill. The light weight, rubber tires, and narrow width of these machines allow them to drive through traffic job-to-job. They self-load easily . . . yet have ample capacity (7 yards) to work profitably in pusher fleets. They operate together or independently, as needed.

For example, when photos were taken, one "D" was grading for a housing project on Chestnut Ridge Drive in suburban Rochester. Here, it self-loaded down a 7% to 10% grade for 100 to 150 feet, then hauled 4½-yard loads of sand across a road to fill low-lying lots. Complete 2000′ cycles took 3.1 minutes, including 48 seconds for self-loading. About 17 loads (76 pay yards) were delivered by the one unit in a 55-minute hour.

Meanwhile, the other Tournapull was working on a similar housing development in Greece, near Rochester, where it leveled areas around new homes for the Barmont Construction Company. Working in second gear, rig self-loaded 5 yards of sand in approximately 200 feet. Time: 1.2 minutes. Despite rough haul roads, 2100′ cycles took an average of only 3.7 minutes. Unit output was about 15 loads (75 pay yards) per 55-minute hour.

You, too, will find Tournapulls profitable on small scattered jobs as well as production dirtmoving. Write us for more job-proved facts and figures covering work like yours. If you would like to see electric-control Tournapulls in action, we'll be glad to arrange a demonstration.

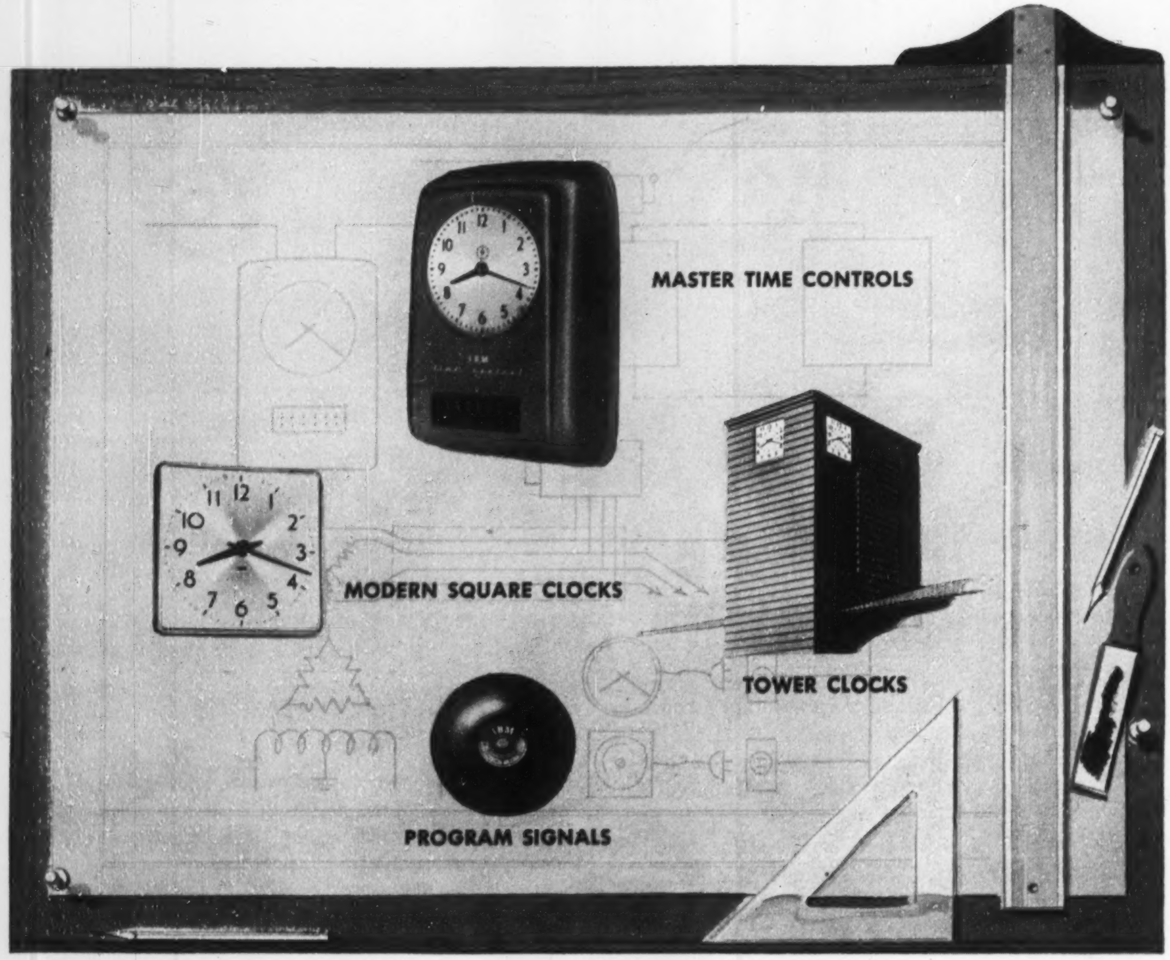
Tournapull—Trademark Reg. U.S. Pat. Off. DP-597-B-b

Operator N. M. Rhoads says, "D Roadster self-loads well. It's easy to operate."

In 2,265 hours of use, this D Tournapull has been 92% mechanically efficient.

A Subsidiary of
Westinghouse Air Brake Company

LeTourneau-Westinghouse Company
PEORIA, ILLINOIS



Simplify Planning . . . No Special Wiring Needed

- **IBM Electronic Time and Program Signaling Systems** eliminate need for special clock and signal wiring . . . synchronize clocks, recorders and audible signals . . . control utilities . . . all automatically.

- **Easy, economical to install** . . . clocks and signals connect with regular AC lighting lines . . . are supervised electronically.

- **Self-regulating on 12-hour basis** . . . master control automatically checks—and corrects as much as 12 hours, if necessary—all clocks twice daily. Automatic self-regulation assures coordination of all time units.

- **Can be altered with little cost or effort** . . . system may be expanded, units relocated, without expense of additional controls or special wiring.

Control Utilities Automatically

IBM Electronic Time and Program Signaling Systems can save costs, conserve natural resources by automatically scheduling utility functions . . .

sound audible signals • open and close ventilators • turn heating and air conditioning systems on and off • switch light circuits on and off • open and close water flow valves.

You're RIGHT ON TIME . . . with

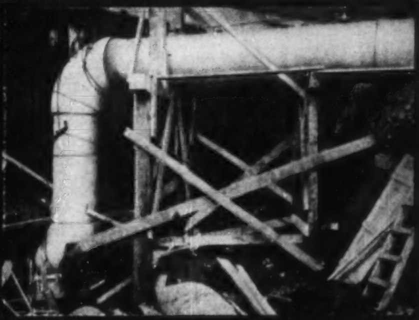
IBM *Time* **EQUIPMENT**

INTERNATIONAL BUSINESS MACHINES • 590 Madison Ave., New York 22, N.Y.
Branch Offices located in principal cities

1.

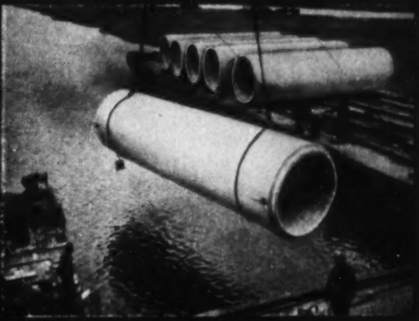
Installing a 30" Lock Joint distribution line in a tight spot in the streets of Richmond, Va.

2.



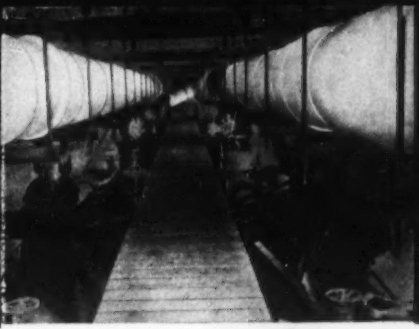
Installation of 30" Lock Joint line for turbine generator plant, Bangor Hydro-Electric Co., Bangor, Me.

3.



Installing section of 60" Lock Joint Reinforced Concrete Subaqueous Pipe, [illegible] County [illegible]

4.



LOCK JOINT

the multi-purpose pressure pipe

Lock Joint Concrete Pressure Pipe has long been recognized as the ideal, high capacity pipe for water supply lines, but its variety of types and designs has also permitted successful use in the following:

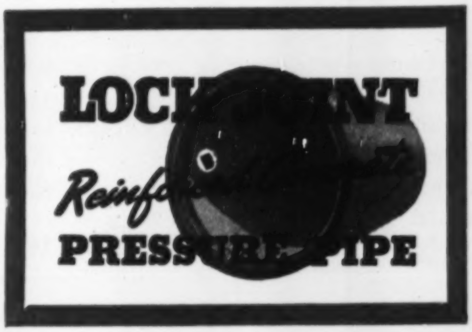
- WATER DISTRIBUTON SYSTEMS
- INDUSTRIAL PLANT INSTALLATIONS (Supply, circulating and cooling systems)
- SUBAQUEOUS INSTALLATIONS (Water intakes, siphons and sewer outfalls)
- WATER WORKS PLANTS (Pumping and treatment plant piping)
- SEWAGE OPERATIONS (Force mains and plant piping)

THESE are some of the major services for which Lock Joint Concrete Pressure Pipe is ideally suited. So, if your pressure pipe problem involves pipe 16" in diameter or larger, call on Lock Joint – the low cost, high capacity, long lasting multi-purpose pipe.

SCOPE OF SERVICES—Lock Joint Pipe Company specializes in the manufacture of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains 16" in diameter or larger, as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.

• •

LOCK JOINT PIPE COMPANY
Established 1905
P. O. Box 269, East Orange, N. J.
PRESSURE PIPE PLANTS: Wharton, N. J., Turner, Kan., Detroit, Mich., Columbia, S. C.
SEWER & CULVERT PIPE PLANTS:
Casper, Wyo. • Cheyenne, Wyo. • Denver, Col. • Kansas City, Mo. • Kennett Square, Pa. Valley Park, Mo. • Chicago, Ill. • Rock Island, Ill. • Wichita, Kan. • Kenilworth, N. J. Hartford, Conn. • North Haven, Conn. • Tucumcari, N. Mex. • Oklahoma City, Okla. • Tulsa, Okla. • Beloit, Wis. • Henrietta, N. Y. • Hato Rey, P. R. • Ponce, P. R. • Caracas, Venezuela



With Homelite Carryable Generators

No matter where you are . . . with a Homelite Carryable Generator, time-saving, *money-saving* power is always by your side. Yes, take a Homelite out on the job and you have instant, dependable power to operate standard universal power tools and floodlights *plus* (if you have a Homelite Dual Purpose Generator) high cycle power tools.

HOMELITE CORPORATION
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134 cu. in. displ.

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172 cu. in. displ.

FORD "223"
6-Cylinder
Engine Assembly
223 cu. in. displ.

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V-8 Cylinder
Engine Assembly
239 cu. in. displ.

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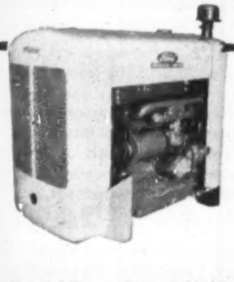

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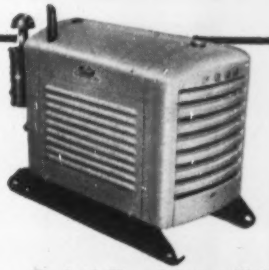

Typical Closed Power Unit
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ROTARY COMPRESSORS

117 units speed construction of the New York Thruway

These four 600 cfm GYRO-FLO portables supply ample air power for operating up to eleven I-R wagon drills on one section of the New York Thruway. Air from a common receiver is piped 700 to 800 feet to the drilling site through a 6″ line. In the background is a completely self-contained I-R Quarrymaster for sinking large, deep blast holes.

Here, an I-R GYRO-FLO supplies abundant air for operating a pneumatic pile hammer, driving sheet piling for construction of one of the Thruway's many bridges.

The GYRO-FLO compressor has repeatedly proved its ability to operate continuously under all types of working conditions, with a trouble-free dependability and easy portability heretofore not obtainable in any portable air compressor.

These compressors furnish air to users of 173 Ingersoll-Rand Type FM Wagon Drills—more than 70% of the total wagon drills on this project.

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One hundred seventeen GYRO-FLO rotary compressors, with a combined capacity of 61,265 cubic feet of air per minute, are speeding the job to completion—driving Ingersoll-Rand rock drills and other pneumatic equipment on this high-speed construction project.

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Available in 125, 210, 315 and 600 cfm, GYRO-FLO offers the only complete line of rotary portables—each size proven by years of heavy duty in the field. Get the complete GYRO-FLO story from your nearest Ingersoll-Rand distributor or branch office. It will save you money now and for many years to come.

2-94

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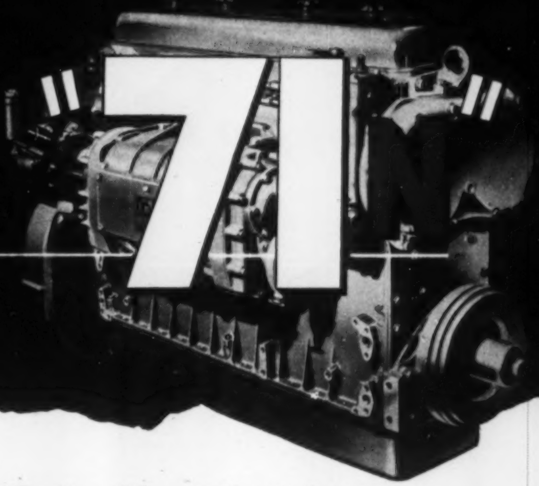

"N" FOR NEW—*New Where It Counts Most*

You don't have to be an old-timer to remember when the first General Motors Series 71 Diesel was introduced. We called it the "71" in 1938 and we call it the "71" today.

But in 17 years these design improvements from top to bottom have given operators higher horsepower, lower fuel consumption and longer engine life. And now, a whole series of new improvements has made this fast-stepping, compact, 2-cycle Diesel better than ever.

NEW **17 TO 1 COMPRESSION** gives better fuel economy, squeezing more power from every gallon of fuel.

NEW **"FIGURE 8" CYLINDER LINERS** give you a cleaner burning, more efficient engine. Air intake area is increased 32% for more complete fuel burning and better exhaust.

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You make "big cuts" two ways when a MARION 111-M shovel moves on the job.

Big yardage jobs move quickly for the 111-M. Its diesel power is balanced with extra heavy design and construction. Gentle air controls put this big machine into action with fingertip pressure.

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OFFICES AND WAREHOUSES IN ALL PRINCIPAL CITIES

ALLIS-CHALMERS Hydraulic TURBINES

Photo courtesy of Stone & Webster Engineering Corporation

Formed from the Osage River by the Bagnell Dam, the Lake of the Ozarks provides storage for the Osage Power Plant equipped with eight Allis-Chalmers Francis-type turbines. This power plant carries part of the peak loads on the Union Electric Company of Missouri's integrated electrical system serving territory in Missouri, Illinois and Iowa.

First There Were Six

In 1930 Union Electric installed six Allis-Chalmers turbines at the Osage Power Plant. These six hydraulic turbines have required no unusual maintenance of any kind and their operation has been completely satisfactory.

When two new turbines were added in 1953, they were also supplied by Allis-Chalmers. Rated 33,500 hp, 90-ft head, 112½ rpm, all eight units are of the Francis runner, vertical, plate steel casing type. Having provided cabinet-type governors for the new units, A-C is now modernizing the valves for the original six governors.

For half a century, Allis-Chalmers has been furnishing turbines, governors and auxiliaries for major installations of all types — propeller, Francis and impulse — in ratings up to 150,000 hp and 2500-ft heads. Write for Bulletins 01B7301 (turbines) and 05B7549 (generators). Allis-Chalmers, Milwaukee 1, Wisconsin, U. S. A.

A-4382

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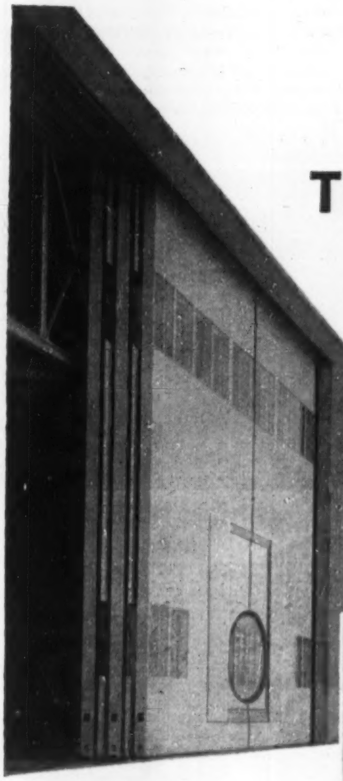
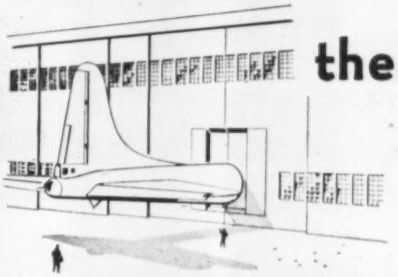
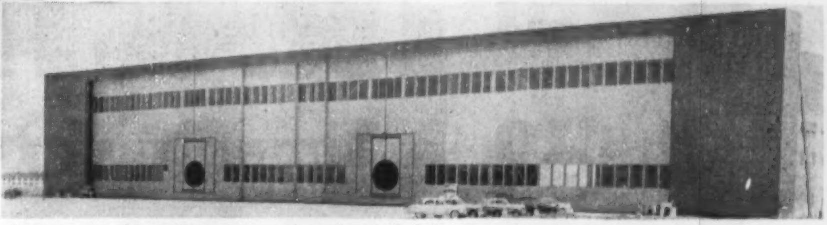


These giant TRUSCON hangar doors close around the big ships





At many air bases, Truscon engineering is helping save interior hangar space without sacrificing maintenance efficiency.

In these double cantilever maintenance-type hangars, pairs of giant Truscon Straight Slide Doors close snugly *around* tail assemblies of big ships! Cut-out door sections and ingenious sealing device mean that maintenance can be performed efficiently and comfortably in any weather, or under blackout conditions . . . with the tail assembly *outside* the hangar. These cut-out door sections can be designed to fit any type or size fuselage and the foam rubber insert allows for variations in height. When no fuselage is in the opening, two sliding closing panels are provided to assure protection from the elements.

This "door within a door" provides a snug seal without damage to fuselage or tail. The straight slide doors can be 35 to 40 feet wide and 65 feet or more high. Fully opened, a clear space 350 to 650 feet or more in width is possible.

Truscon makes hangar doors to fit every need, every size of opening. All are products of more than 28 years' *specialized experience* in big door design and construction. Write for details and specifications describing Truscon Straight Slide Steel Hangar Doors and other major types.

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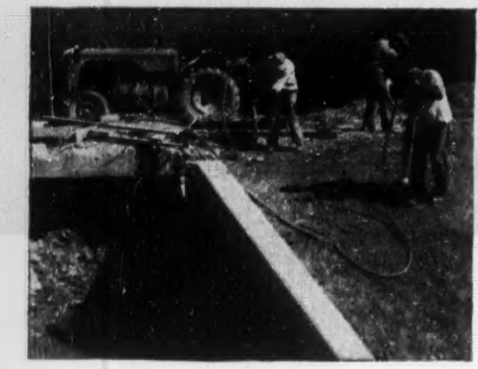
A NAME YOU CAN BUILD ON

Tamping — Here's a Le Roi-CLEVELAND back-fill tamper air-powered by Tractair, that gives you faster, easier tamping, better compaction, lower costs. This example shows how Tractair teams up with Le Roi-CLEVELAND Air Tools to save time, work, money.



Cutting asphalt pavement — with a Tractair-powered Le Roi-CLEVELAND paving breaker. Note, Tractair in background is equipped with a sweeping attachment. This is just another of many ways that Tractair can save you money.

Drilling trench — Easy holding Le Roi-CLEVELAND sinkers provide the fastest way of drilling rock. The air-power source is a Tractair, equipped with a front-end loader. Tractair is extremely mobile. It has a low center of gravity. It takes money-saving air power anywhere.

LE ROI TRACTAIR

...the 10 in 1 machine that does 10 basic jobs to save you money

It holds down your investment in special equipment

Because Tractair is a combination 35-hp wheel tractor and 105-cfm air compressor, it is extremely versatile.

It lets you take air power wherever you want it — air power for drilling rock, tamping fill, breaking concrete, driving spikes and form pins, or pumping water.

When it is equipped with attachments, you get added usefulness. You can load, back-fill, dig, sweep or hoist.

Although Tractair was pioneered and developed by Le Roi Company to do 10 basic jobs, its money-saving usefulness on costly, nuisance-type work is limited only by the user's imagination.

If you want to cut costs, get Tractair. Call your Le Roi dealer for a demonstration, or write us for further information.

LE ROI GIVES YOU MORE FOR YOUR MONEY

More Utility!
More Profits!

Loading — Tractair takes air power practically everywhere, yet it can be used for a wide variety of other jobs. Its front-end loading attachment, for example, has 8 accessories that interchange easily, so that Tractair can load, lift, back-fill, plow, etc.

Tractair with Mobildrill — Mobildrill is a lightweight wagon-drill attachment for Tractair. It gives you unusual mobility — one man can drill holes at any angle and any elevation up to 12 feet. Swinging boom permits drilling 4-6 holes of a pattern from one spot.

Compressors
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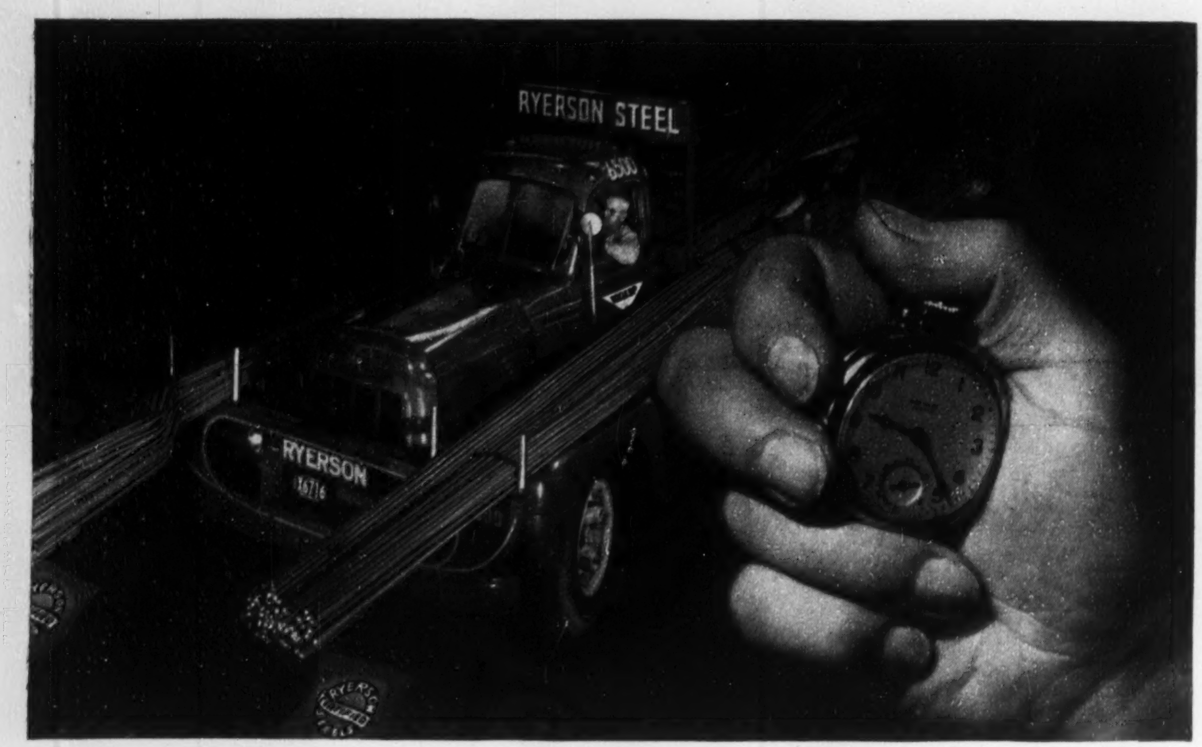

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Getting construction steel to you—*exactly* when you need it—is a specialty of Ryerson re-bar service. You can count on absolutely dependable deliveries because your nearby Ryerson plant has the world's largest steel stocks and the facilities to get out your requirements in a hurry when your job moves ahead of schedule. And we have the facilities to hold your ready steel here, rather than to pile it on your site. We work closely with you always—adjusting deliveries in accordance with the progress of your project.

You can be sure, too, of the quality of re-bars from Ryerson. All are hi-bond type, designed for greater grip and guaranteed to meet or exceed ASTM spec A305. They are delivered to you cut, bent and tagged—ready for immediate use. We also furnish wire mesh, structural steel, forms, floor plate, etc.

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THE CONSTRUCTION WEEK

DO THEY STAY?—Contractors, big and small, are doing a lot of worrying about other contractors in connection with construction of big toll roads.

The question: Do the "outside" contractors who come in to do toll road work stay around after their toll jobs are finished—and what effect do they have on the regular programs of the state highway departments?

The answer: Apparently they do stick around, preferring to keep their crews and equipment working the area. And they've been adding woe to the competitive troubles of the local men.

LABOR TALKS—AGC's long-standing disagreement with Tennessee Valley Authority over labor rates in the TVA area may be approaching some kind of a solution.

Local AGC men have long complained that TVA sets rates—which are usually taken as standard for the area—without consulting anyone else.

But the contractors now have a committee working directly with TVA labor people, to try to iron out this difficulty, and the problem of TVA use of "day labor", rather than contract work.

ERROR, BUT OK—Harmon Construction Co. of Oklahoma City, will still build the Kansas State Office Building at Topeka—even though its low bid contained a $250,000 error.

Harmon's low bid was $4,657,944. But it was so far below the 15 other bidders that even the addition of $250,000 didn't affect the status of the bid.

CONTRACT WORK SAFE—Contractors' worries that there might be a loophole that would permit more force-account highway work in the 1954 appropriations bills apparently needn't be serious.

Section 17A of the act says flatly that construction work "financed in whole or in part" by federal funds shall be done by contract awarded in competitive bidding. What has worried contractors is that the act also provides that on the secondary highway system, states may supervise their own work, certify to the Commerce Department that they have complied—and needn't have to submit for the detailed check of the Commissioner of Public Roads. Many have seen this provision as opening the door for force-account work.

But the Bureau of Public Roads says no. Secondary roads by force-account must be approved singly and separately by BPR—and BPR has no intention of upsetting its long-standing contract policy. It'll make exceptions for states where force-account is long-established custom, and that's all.

~~CUTS~~ Winter Concreting Costs

'Incor' Saves $1 per Cu. Yd. on Heating Costs and 2 Months' Time on Hammel Houses

FRAME CONCRETING on Hammel Houses, 14 seven-story buildings, began November 16, 1953. CAYE CONSTRUCTION CO., INC. had a Winter job on their hands, and as they put it, there wasn't any question, the cement to use was 'Incor'.

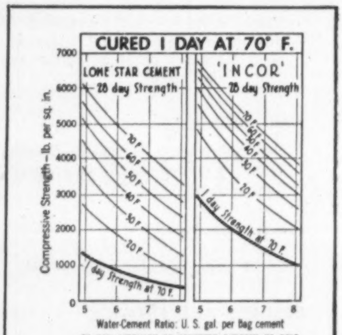
With 'Incor' 24-Hour Cement and one-day heat-protection, forms were stripped and re-used in 24-48 hours, averaging 1.3 floors a day, even at lowest outside temperatures. Heaters using propane cylinder gas provided clean, uniform heat, with minimum labor costs.

The Contractor figures 'Incor' saved two months' time and cut heating costs by two-thirds, saving $1. per cu. yd. of concrete.

Concrete design called for 550 lbs. cement per cu. yd., and 3000 psi 28-day strength. Tests showed strengths uniformly close to 4000 lbs. . . . field corroboration of data summarized in graph, shown at right, above.

The saying—"Any time is 'Incor'* time"—goes double in cold weather!

*Reg. U. S. Pat. Off.



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Owner:
NEW YORK CITY HOUSING AUTHORITY
Architects: **LORIMER & ROSE,** New York
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WASHINGTON OBSERVER

Ways and means of financing Eisenhower's ambitious highway program are firming.

This week's meeting of Gen. Clay's special committee will hear all sides. But advisers from the various groups are reportedly settling on one major method of getting a big chunk of the work going. It's this:

Establish 100% federal financing of the so-called interstate system through legislation setting up a lending institution that would sell bonds to the public and pay back with revenues from a permanent federal gasoline tax. There's about 75% to 80% of the 40,000 mi interstate system still to be rebuilt and improved—a $20-billion job.

This scheme has important backing from many sides—including members of the governors' committee which is assigned to turn in a program by the end of the year. It's big, promising business to construction people, of course.

The Interstate System is only one part of the $50-billion program that Eisenhower sprang in his governors conference statement. Ideas on how to expand primary, secondary and urban highways will be thrown into the hopper during the Clay committee's two-day meeting. For instance, the Associated General Contractors will be in with some plan for increasing state gas taxes to finance the expansion (see page 71).

•

But considerable detail can be given on the interstate part—as the thinking shapes up now.

- **A Government Institution would be created** to raise the money for grants to states for the interstate improvements. It would sell bonds to investors to get the money. It would pledge the Treasury and the 2-cent gasoline tax against the bonds.
- **The state highway departments would manage** the design and construction, just as they do now.
- **Washington might even pick up the bill** for maintenance through some sort of allocation yardstick.

•

The whole program will be pulled together shortly after election. The schedule now: have the governors meet at the White House and put their stamp on the message Eisenhower will give to Congress next session. The governors' committee won't report to the conference until after election. But by then, Clay's group, being aided by a special committee of experts headed by Pyke Johnson of the Automotive Safety Foundation, will be ready to act.

Recommended legislation to Congress early in the year is the target.

•

Eisenhower has nailed political talk that REA building will be cut. He went on the record to say that he would stand behind continued construction. He charges the rumors are Democratic "scare talk."

•

AFL Building Trades Dept. is going to ease Dan Tobin off its executive council. And it won't replace him with a teamsters' union man. The teamsters have very few workers in the construction field, so they will be dropped.

•

Construction of the Dixon-Yates steam plant is becoming doubtful. The politics between private and pro-TVA power groups has broken into open warfare. And neither the government nor the private combine that would build the plant can risk signing a contract until the air is cleared.

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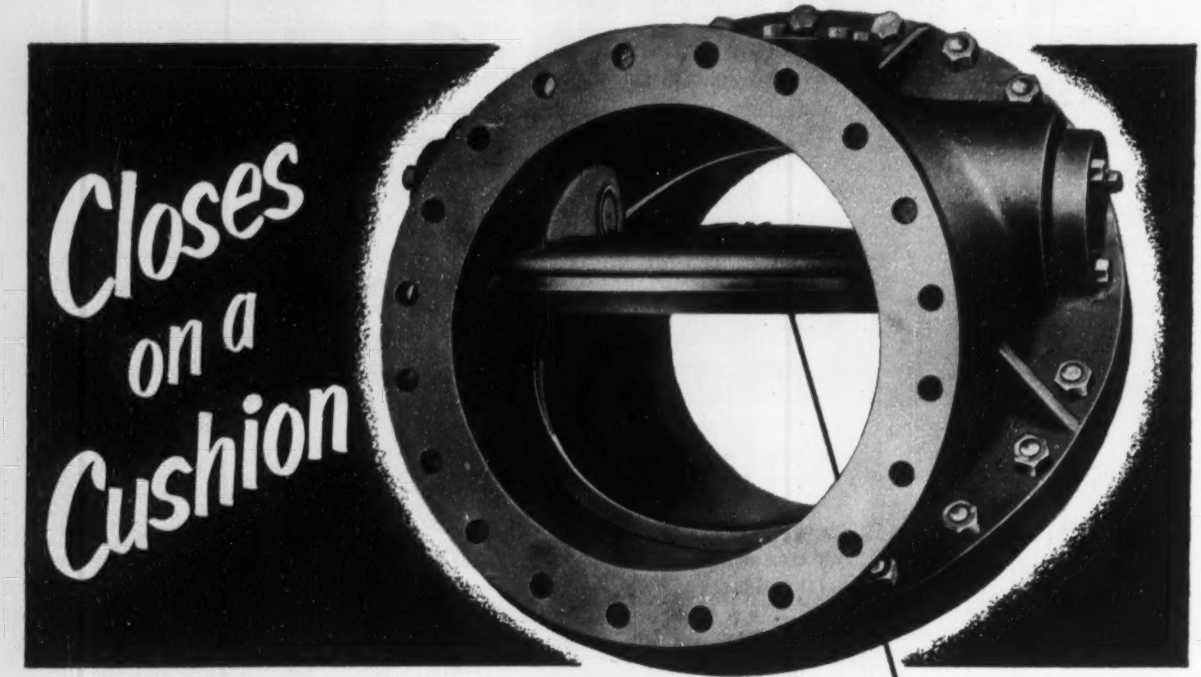

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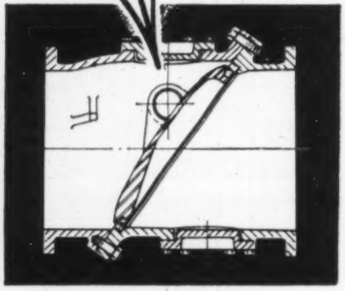

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OCTOBER 7, 1954

ENGINEERING NEWS-RECORD

AGC takes sharp look at construction policies

Contractors see state financing problem in Eisenhower road program; favor new approach on Taft-Hartley issue

E. E. Halmos, Jr.
Managing Editor

The nation's contractors are convinced that there's a bright, profitable future ahead for the construction industry in the next few years—but they're inclined to view that future with some caution.

They haven't any doubts about their own or their industry's capacity to cope with the huge highway program, for instance, that was proposed recently by President Eisenhower (ENR July 22, p. 21). But they know that the competitive situation is already tough and will get tougher, and they want to be sure that what the industry does is based on a sound economic footing, well supported with the men, machines and materials that will be needed.

That general feeling was clear enough as the Associated General Contractors ended a three-day, mid-year meeting of their governing and advisory boards at St. Louis last week.

Evidence of this attitude was clear enough in the four major points the contractors centered their attention upon throughout their hardworking sessions:

1. They wanted no changes in the existing labor laws, short of a full-dress revision.
2. They were very much concerned with methods of financing the President's highway proposal—and maintaining other highway programs as well.
3. They were very much concerned with how to settle their differences with specialty subcontractors, short of a federal law.
4. And they repeated their warnings that "stop-and-go" scheduling of public works can't do anything but harm the industry and the nation's capacity to react fast with major construction works in times of emergency.

• **Labor legislation**—What the AGC's leaders said on labor was specific enough. But it needed the benefit of individual discussion for a full interpretation of its meaning. In a resolution, they called for:

- No weakening of the secondary boycott provisions under Taft-Hartley—as was proposed by the President in his January message to Congress (ENR Sept. 23, p. 21). Mandatory injunction proceedings provided in the act should be retained.
- Quick handling of jurisdictional disputes by the National Labor Relations Board, in instances where actions of the National Joint Board for Settlement of Jurisdictional Disputes are defied or ignored.
- Rights of the states to pass and enforce labor legislation shouldn't be abridged by the federal government.
- No change (as has been suggested by labor leaders) in the 30-day union shop wait.

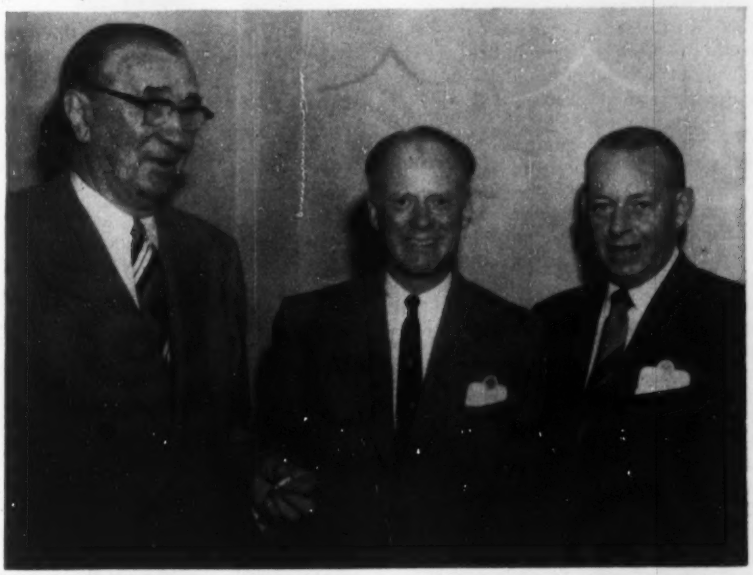
At face value, these resolutions appeared to be in direct opposition to the demand made only a week before by the AFL's Building Trades Department for virtually a new law to cover only construction.

But a careful check among the more than 300 contractors who attended the sessions made it clear that they had another objective in mind:

Rather than accept piecemeal revision of the present law, the builders would have the law stand as it is. What their attitude would be toward a completely separate piece of legislation to cover construction labor is uncertain enough, but they obviously don't want half-measures that would create even more complicated situations in an already complicated matter.

• **How to pay for roads**—Financing such a vast expansion of highway work as has been proposed occupied almost as much time in the formal meetings as it did in lobbies and across the bars. And the related problems of engineering manpower to staff such a program, the availability of materials for it, and what it might do in an already tight competitive situation took up equal discussion time.

(*Continued on page 72*)



AGC LEADERS—President John McLeod congratulates George C. Koss of Des Moines now vice-president, on his nomination for president; and Frank J. Rooney, Miami contractor, named as candidate for vice-president. New officers will be elected and seated at AGC's March 1955 convention at New Orleans.

. . . Construction policies

The AGC, among other groups, has been asked to appear before a Presidential commission to give its views, and the group's officers sounded out the membership present informally.

The consensus seemed to be this:

The only way the states can pay their share of the expanded program probably is through added gasoline taxes—which members would rather call a use-tax, or a toll, on the theory that it is a tax only on the person who makes most use of the highway.

And the only way to get voter approval of such a hot potato as adding pennies to gasoline prices (admittedly political dynamite in many states) is through a campaign of public education as to the need for the road program—and most importantly, of the relatively small cost to the individual car owner.

One state—Iowa—already has prepared a motion picture (through its Good Roads Assn.) for showing at local civic gatherings, to demonstrate these points. There seemed to be no other sound program available for financing. Quite obviously, the group had discarded any thought of added property levies, and was inclined to view with some disfavor the issuance of revenue anticipation bonds, or use of other financial devices.

• **Can we do it?**—There wasn't any apparent doubt that the contracting end of the construction industry has the physical capacity and the know-how to absorb this amount of highway work.

But there were ample doubts as to the availability of manpower in the technical and professional fields to handle it, and of the availability of materials—when and where needed.

The rather sorry figure of 17,000 civil engineering graduates in June 1954, and predictions of even lower graduations in 1955, bobbed up in discussion after discussion. (One move the contractors are already making to help this situation is the activity of a brand-new education committee, already cooperating with professional societies on the problem, and studying plans for other special efforts.)

The materials problem has already appeared, particularly where toll superhighways are being rushed by several states. Numbers of the contractors were vociferous in calling for action to make sure that materials manufacturers keep abreast of developments and gear their production so that materials will be available, even when an abnormal demand exists.

• **Getting along with subs**—The knotty problem of bid-shopping, and the persistent attempts of specialty subcontractors to put through legislation that would separate bids on federal work, didn't seem nearer solution.

The subs have long contended that they are being squeezed between the greed of the general contractor and their own problem of maintaining an organization and staying in business. Many of the generals have answered that the subs' own greed is the major cause of their plight.

But the answer of the subs has been to seek legislation—an answer that got nowhere at the last session of Congress, largely due to AGC efforts.

Recognition, however, that neither general nor sub can long operate successfully alone, or at odds, AGC has advanced a proposal that its standard bid forms and Code of Ethics—which states that the subs must be named in the general's bids, and must be given the contract at their price thereafter (with some technical exceptions)—be accepted.

Lengthy studies, committee members reported, have shown that legislation on a national scale isn't the answer. Too many local factors affect the situation.

So the group agreed that all member chapters and all of the association's 6,507 members be urged to settle their problems on the local level where possible, and adhere strictly to the Code of Ethics.

• **Miscellany**—There were many other matters before the governing and advisory groups at the long sessions—all of them falling fairly well into the pattern of hope, with caution.

Among other things, the groups passed a resolution to support the American Society of Civil Engineers in its stand against unionization of professional personnel; approved a complete re-editing and some revision of the AGC's governing provisions; appointed a committee to look into the possibilities of taxing airplane gasoline for revenues for airport construction.

Importantly, they urged on the U. S. government's contracting agencies that bids on government work be read, if the bids are not accompanied by the specified security. Discussion disclosed that a recent ruling of the Comptroller General makes it possible for a bid to be accepted when not accompanied by security, if the required security is obtained within a reasonable time. AGC contends this is an invitation to sharp practice—leaving the successful contractor an "out" if he decides he has bid too low, making it possible for him to put up no money at all if he isn't.

School allocations

$45 million granted for additional facilities in federal impact districts

Nearly $45 million was allocated last week for new school construction in federally affected areas. The money goes to 288 school districts in 40 states, Alaska and Hawaii.

Another $10 million was allotted this week to reimburse 95 communities in 30 states. These localities had used their own funds to build new school facilities to take care of added pupil enrollment resulting from federal activities.

Together, the two sets of fund reservations just about complete allocation of the $55 million that Congress voted for school construction in the supplemental appropriation bill. The earmarked funds go to projects filed with the U. S. Office of Education as of June 30, 1952.

School districts have the option of using the funds in several ways. They can go ahead with construction of projects on file; they can substitute new or different projects; and, finally, those that have built facilities with local funds may change their requests to reimbursement.

Districts that want to construct additional classroom facilities should go ahead as in the past, Commissioner of Education Samuel M. Brownell says. If a district has already done the building and has not yet asked for reimbursement, it should submit the request and supporting information to the Office of Education.

Biggest state allocation of funds out of the $45 million goes to nearly 60 projects in California, totaling more than $20 million.

Oil shale asphalt given test

Asphalt material made from oil shale has been spread on 10 blocks at Rifle, Colo., and will be subjected to tests to determine the material's suitability for road surfacing. The U. S. Bureau of Mines experimental shale plant at Rifle donated 500 bbl of road oil to the city for the project.

The asphalt material is shale crude oil with the gasoline and diesel fuels removed. It is mixed with fine gravel and applied the same as petroleum asphalt. Boyd Guthrie, chief of the bureau experiment station, said the crude oil looks and acts much like petroleum but has a higher wax content making it unsuitable for lubrication.

Guthrie said shale asphalt does not meet road material standards because the standards are based on petroleum products.

FHA to boost apartment construction

Agency plans to liberalize rules governing yield insurance as move to reverse sharp decline in rental construction

Yield insurance—a nearly forgotten government aid to apartment construction—is being polished up by the Federal Housing Administration to counteract the abrupt decline in new rental projects. FHA is getting ready to liberalize its rules on yield insurance, make them attractive to builders and investors for financing of rental housing.

Yield insurance is altogether different from mortgage insurance—the field in which FHA is best known. Under yield insurance, FHA insures the bonds that finance a project. The insurance protects the investor on two points: It guarantees a sufficient annual amortization charge to retire the bonds when due, and it insures the interest payment up to a maximum of 2¾%.

FHA can make commitments for the insurance before ground is broken for a project to be built in conformity with approved plans and specifications and in accordance with FHA standards and regulations. Those requirements differ little from FHA rules for projects financed with insured mortgages. In both cases, the insurance contracts are signed and take effect upon satisfactory completion of the project.

Easiest way for a builder to operate under yield insurance is to create a corporation to construct and own the rental housing project. The corporation would issue bonds to raise the money for the project. Buyers of these bonds, in turn, would be insured by FHA both as to principal amount and as to annual interest return, up to the percentage covered in the insurance contract.

• **Applications drop off**—There is reason for FHA to be worried about the drop-off in applications for rental housing. In the last six years, FHA-insured mortgages have financed construction of some 360,000 rental units, more than 50% of the new multifamily housing started during that period. Even in each of the last two years, 1952 and 1953, after the special incentives of Section 608 had expired, FHA insurance supported more than 25% of the new multifamily housing that got under way.

But FHA mortgage insurance no longer is effective in producing rental housing. Project applications fell off to zero in the first four weeks of September. The August total amounted to only 100 dwelling units.

This slide-off is the result of the 1954 housing law, signed August 2. Contrary to its generally stimulating effect on other types of home construction, the latest law has practically killed all builder plans for FHA mortgage financing of ordinary apartment projects.

The new legislation requires builders to certify actual costs, and it limits the insured mortgage to 80% of those costs on regular run-of-mill apartment buildings of the kind that have been springing up in cities and suburban areas during the last 10 years. These binding restrictions have caused builders to shy away from FHA rental projects.

• **Substitute incentive**—Yield insurance offers an alternative method of getting builders back into apartment house construction. Buried in the National Housing Act since 1948, yield insurance has laid unused and unnoticed while it was more profitable to build apartment houses under Section 608 or other insurance provisions of the law.

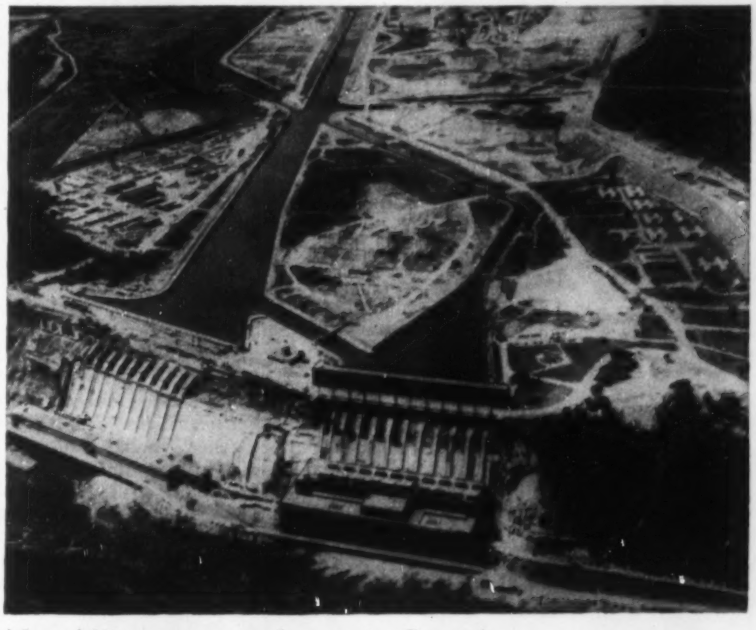
As written into Title VII of the act by Congress six years ago, yield-insurance language is broad enough to permit drafting of more attractive regulations than FHA has imposed so far. Two important limitations can be eased: those applying to maximum rents and to interest rates on the bonds.

Congress adopted yield insurance to aid construction of rental housing for families of moderate income. But it authorized the FHA commissioner to set the rent schedule for a project and to insure minimum annual amortization plus up to 2¾% of the interest return on the bonds that finance the project.

FHA's old and unused rules have limited average rent to about $100 per dwelling unit in a project, with a maximum of some $120 for an individual unit. And they have said that the bond interest rate could not exceed the insured return, which is limited by law to 2¾%.

Both of these limitations are being studied by a five-man FHA committee set up by Commissioner Norman Mason. New rules modifying the current restrictions are expected within eight weeks.

Limits on both rents and bond interest would seem to be necessary parts of any new regulations that are established.



New Niagara powerhouse in Canada

Sir Adam Beck No. 2 power plant (left) on the Canadian side of Niagara River, 6 mi below the falls, will have a capacity of 1,200,000 hp when it is completed next year. Alongside the new unit is its companion powerhouse (right) completed in 1921. Canals to the two powerhouses form an island which is the switchyard for the new generating station.

The new open-cut canal (left) extends 2¼ mi to the exits of twin 5½ mi tunnels which carry water from above the falls, under the city of Niagara Falls, Ont., and into the canal.

Labor under fire

Question is should unions come under anti-trust law

A showdown is getting closer over the efforts of some Administration leaders to end the virtual immunity of organized labor under the federal anti-trust laws. And the building and construction trades are being cited as heavy offenders who have dodged around the anti-trust barriers for years, with seldom a scratch.

That record of abuses and relative immunity constitutes a principal bulwark of the Commerce Department's current effort to bring labor unions within the reach of the anti-trust laws.

The current battle stems from a recent meeting in Ann Arbor, Mich., of a special committee of lawyers and economists appointed by Attorney General Brownell to re-examine the anti-trust laws. Essentially its purpose is to recommend to the President desirable changes in the structure of the laws and in their enforcement.

Among the reports received at Ann Arbor was one from the work group on labor exemptions, which included liaison representatives of the Commerce and Labor Departments.

A majority of the work group favored preservation of the union anti-trust exemption but the full committee failed to take final action. Instead, it indicated that a further "meeting of minds" was necessary and dumped this politically explosive problem into the lap of committee co-chairmen Stanley N. Barnes, anti-trust chief, and S. Chesterfield Oppenheim, Michigan law professor.

What action the full committee will take at its next meeting is not yet clear. But the fact that Commerce Secretary Weeks is a member of the committee and Labor Secretary Mitchell is not will give Commerce a chance to push its position still further.

• **Charge**—Commerce lost no time in getting its position before the full committee. In a 27-page brief, Commerce listed violations that have flourished in the building trades.

Prominent in these charges were unions representing painters, plumbers, glaziers and common laborers. Among their violations, said Commerce, are restrictions on the use of various building products, elimination, in some areas, of new building processes and improvements, area-price-fixing practices, and geographic restrictions on business operations.

• **Remedy**—Commerce rejects the idea that the chief union monopoly abuses—featherbedding and secondary boycotts—can be effectively handled under the Taft-Hartley law. It views that law as one that puts primary emphasis on collective bargaining.

It advocates legislation banning certain types of union practices:

- Activities relating directly to representation of employes in regard to wages, hours, and working conditions would remain "legitimate."
- Economic pressure exterted against an employer by a union by strike or primary boycott—while representing employes in these matters—would be beyond the reach of anti-trust laws.
- It would be left up to the courts to decide when a union goes beyond these legitimate activities.

• **Labor Dept. opposed**—The Labor Department takes the position that legislation such as this would open the gates to a flood of union-busting activity. It strongly opposes any efforts to change the existing anti-trust laws. After the Ann Arbor meeting, Secretary Mitchell indicated that union abuses should be dealt with under labor laws now on the books.

The Barnes-Oppenheim draft report will be on the agenda of the next meeting of Brownell's full committee. In the meantime, informed observers confidently expect to hear more from the Commerce Department.

Labor's heydey, which the Commerce Department seeks to end, got its start back in 1932 when the Norris-LaGuardia anti-injunction act was passed. The broad definition of "labor dispute" which that law contains vastly enlarges the anti-trust law exemption which is granted to labor organizations under the Clayton Act. Behind the skirts of this immunizing legislation has grown "labor's exemption" as it is known today.

Army Engineers ask bids on Oahe Dam in Missouri

The Omaha District office of Army Engineers has invited bids for the stilling basin at Oahe Dam on the Missouri River near Pierre, S. D. The bids will be opened Nov. 23.

The contract will be the fifth major one at the dam. So far, $33.6 million has been appropriated for the $300-million dam.

The basin will be a two-stage one because a single-stage basin would be so deep that it would carry the excavation through the stratum of Pierre shale of the basin's foundation.

The basin will be approximately 500x500 ft. The slab, anchored with tie rods, will range up to 5 ft thick. It will take water coming from the dam's six flood control tunnels, each about 19 ft by 3,432 ft, and rob it of an estimated 1,700,000 hp of energy.

Federal power plant

Missouri Basin project will be $44-million job

The first start of a federal public power plant under the Eisenhower Administration will be made in Wyoming with a $1-million appropriation that escaped general notice in the closing rush of the 83rd Congress.

Those funds will begin construction on the $44.3-million Glendo Unit, a Missouri River Basin project, on the North Platte River.

Bureau of Reclamation engineers, who have outlined a five-year construction program, said the initial appropriation will be spent on foundation work at Glendo Dam, power plant and diversion tunnel; on access roads; and to start building the reclamation construction camp at the town of Glendo, about 80 mi. southeast of Casper.

Glendo Unit consists of the Glendo Dam, reservoir and power plant about 4.5 mi. southeast of the town of Glendo, and the Fremont Canyon power plant at the backwaters of Alcova reservoir, southwest of Casper. Fremont Canyon is about 130 mi. upstream from the Glendo Dam. The Glendo power plant will have two units, each with an installed capacity of 12,000 kw, utilizing a maximum operating head of 133 ft and a minimum of 67 ft. The Freemont Canyon power plant will have two units, each with installed capacity of 24,000 kw.

Reclamation officials said Glendo reservoir will provide irrigation, flood control, sediment control and municipal and industrial water supply benefits. The bureau values these benefits at an estimated $2,619,400 annually.

The reservoir will have a maximum controlled storage of 1,088,000 acre-ft, including surcharge. The maximum allotted storage for irrigation will be 100,000 acre-ft of supplemental irrigation water to lands in Wyoming and Nebraska.

Glendo Dam will be an earth-fill structure with a maximum structural height of 203 ft. Its crest length will be 3,407 ft. A diversion tunnel 2,300 ft long will lead from the reservoir across a horseshoe bend in the river to the Glendo power plant.

In addition to collecting incremental flows received by the North Platte River from a drainage area of 15,500 sq mi. lying above Glendo and below Alcova, the new unit will be valuable for re-regulating of releases from upstream power plants.

The invitation for bids on the initial construction contract on the Glendo Unit was issued by the Bureau of Reclamation Sept. 17. Specifications were to be available Sept. 30.

ALLIS-CHALMERS
START OF CONSTRUCTION-SEPT. 21, 1954
INDIANA EAST-WEST TOLL ROAD
RIETH-RILEY
CONST. CO. INC

INDIANA'S GOVERNOR takes the controls and Ohio's governor rides as passenger on well-marked groundbreaking bulldozer.

LUNCHEON centerpiece was cake with replica of an interchange in frosting.

Hoosiers break ground for toll road

Gov. George Craig of Indiana climbed aboard a tractor-bulldozer to move the first official cubic yard of earth at groundbreaking ceremonies for the $280-million, east-west Indiana toll road.

Actually, the governor was a bit late. The subcontractor on the job had been clearing, grubbing and stripping top soil for the better part of a week. But neither this tardiness nor the chilly, raw weather lowered the enthusiasm of the crowd of about 2,000 who gathered to see the official start of construction on Indiana's first major toll road project.

The Indiana Turnpike will start at the Illinois line, on the outskirts of Chicago, cross the northern part of the state and hook up with Ohio's $326-million toll highway which runs 241 mi to join the Pennsylvania Turnpike.

Gov. Frank Lauche of Ohio, a guest at the groundbreaking ceremonies, said completion of the Ohio and Indiana toll highways will mark a new era in highway transportation between the Atlantic Coast and the Mississippi Valley. The two turnpikes, he said, represent the final links in a network of toll roads and turnpikes connecting New York and Chicago.

Site of the groundbreaking ceremony was the exact point where the new toll road will cross the old Chicago Trail which had its beginnings in an 1821 treaty with the Chippewa, Ottawa and Potawatomi Indians giving the United States the right to build a road between Detroit and Chicago. Today, the Chicago Trail is a well-maintained county road which will cross over the four-lane, divided toll road on an overhead structure.

The groundbreaking site also is part of the first section of the road to be put under contract. The Rieth-Riley Construction Co., Goshen, Ind., holds a $3.4-million contract for building 7.4 mi of the road.

Rieth-Riley have subcontracted the earthmoving and related work to Chapin and Chapin, Inc., Norwalk, Ohio, who expects to complete 1,000,000 cu yd of excavation and borrow before the job is shut down this winter.

The Indiana Toll Road Commission is opening bids every Wednesday and expects to have all but 20 mi of the road under contract by the end of this year.

The order of awarding construction contracts is based on the completion dates for design plans and contract estimates rather than on any particular schedule based on geographical progression.

At the first bid opening on Sept. 1 (ENR Sept. 9, p. 25), contractors were instructed to bid on two completion dates—Oct. 30, 1955, and June 30, 1956. The low bidder on the earlier completion date was $122,000 higher than Rieth-Riley's bid for the later completion date. Similar results in the next two bid openings led the commission to request contractors to submit bids based only on the later completion date beginning with the Sept. 22 letting.

Bids opened on the last four Wednesdays in September cover the eastern 52 mi of the toll road, including three interchanges and a toll plaza near the Ohio line. All four construction contracts carry a completion date of June 30, 1956, so this 52-mi stretch of the toll road will be the first to start earning revenue. This section probably will be in operation about the middle of 1956.

Two South Carolina contractors—Suber & Co. of Whitmire, and Ballenger Paving Co. of Greenville—are building the extreme eastern section of the turnpike. Their 12.4-mi section will connect with the Ohio toll road now under construction. They submitted the low bid of $7.5 million at the Sept. 8 bid opening in competition with 17 other bidders.

CONTRACTOR gets to work quickly when officials and guests depart.

Reclamation Bureau completes study for $230-million California project

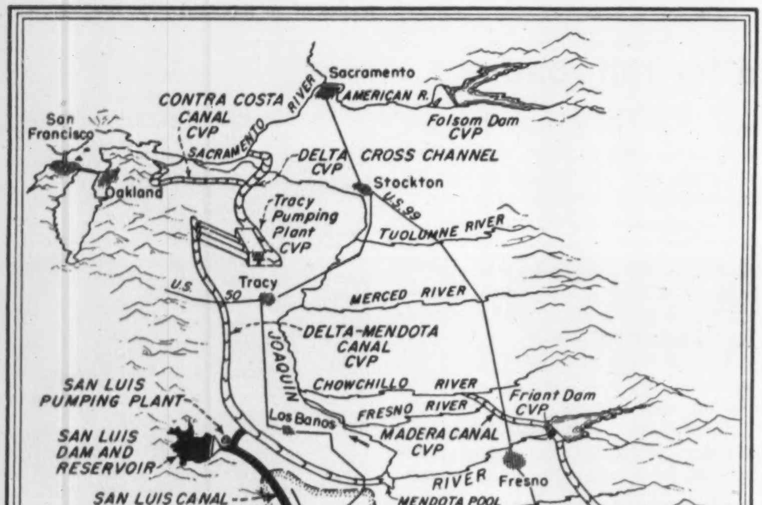
The Bureau of Reclamation has completed a study for a new $230-million unit of the Central Valley Project in California. The study estimates that the San Luis development on the west side of San Joaquin Valley would have a ratio of benefits to cost of 3.2 to 1.

The proposed unit would furnish a surface water supply of 1,250,000 acre-ft a year to supplement diminishing groundwater resources in a 500,000 acre region.

The bureau's report on the San Luis unit has been submitted to local, state and federal agencies for comment. A final report is expected to be completed in late October or early November after these comments are reviewed. The report then will go to Congress.

Principal features of the San Luis unit would include an intake canal and pumping plant, a 1,000,000 acre-ft reservoir, a main canal with a capacity of 6,800 cfs, relift pumps to serve areas above the main canal and transmission lines to carry pumping power from the present CVP facilities at Tracy.

Water would be pumped from the Sacramento-San Joaquin delta and would flow through the first 67 mi of the Delta-Mendota Canal of the CVP. At that point, a new 200,000 hp pumping plant would lift the water into the proposed San Luis reservoir for regulation. From the reservoir it would flow into the 104-mi San Luis Canal.


Sacramento
AMERICAN R.
CONTRA COSTA CANAL CVP
RIVER
San Francisco
SACRAMENTO
Folsom Dam CVP
DELTA CROSS CHANNEL CVP
Oakland
Stockton
U.S. 99
Tracy Pumping Plant CVP
TUOLUMNE RIVER
U.S. 50
Tracy
MERCED RIVER
DELTA-MENDOTA CANAL CVP
JOAQUIN
SAN LUIS PUMPING PLANT
CHOWCHILLO RIVER
FRESNO RIVER
Friant Dam CVP
Los Banos
SAN LUIS DAM AND RESERVOIR
MADERA CANAL CVP
RIVER
Fresno
SAN LUIS CANAL
MENDOTA POOL
KINGS RIVER
PLEASANT VALLEY PUMPING PLANT
RIVER
KOWEAH
PLEASANT VALLEY CANAL
Coalinga
Avenal
TULE RIVER
TULARE LAKE
Kettleman City
Lost Hills
FRIANT-KERN CANAL CVP
U.S. 99
State 33
RIVER
KERN
Bakersfield
BUENA VISTA LAKE
Taft
LEGEND
San Luis unit features
San Luis unit service area

Clyde Spencer, director of the Bureau's Region II office in Sacramento, said year around use of the Tracy pumping plant and part of the Delta-Mendota Canal to transfer water into the San Luis reservoir during the slack irrigation season would lower the cost of water substantially.

Spencer estimated the operation of the pumps would require 700,000,000 kwh of electric energy a year. The power would be provided by CVP power plants at Shasta, Keswick, Folsom and Nimbus. The Trinity River project, when and if it is constructed, might also contribute power.

The bureau now is investigating whether it would be feasible to sell "falling water" on the Trinity River to private or public agencies to develop power resources. Proponents of San Luis have attacked this proposal as likely to take so much power as to make San Luis not feasible.

Bills are pending in Congress to authorize the Trinity project, where considerable power would be developed, jointly with the San Luis unit. The bureau's plan calls for channeling Trinity River water to the Central Valley by tunnel above the CVP Keswick Dam. The water then would become available for use in the Sacramento and San Joaquin Valleys in the operation of the CVP.

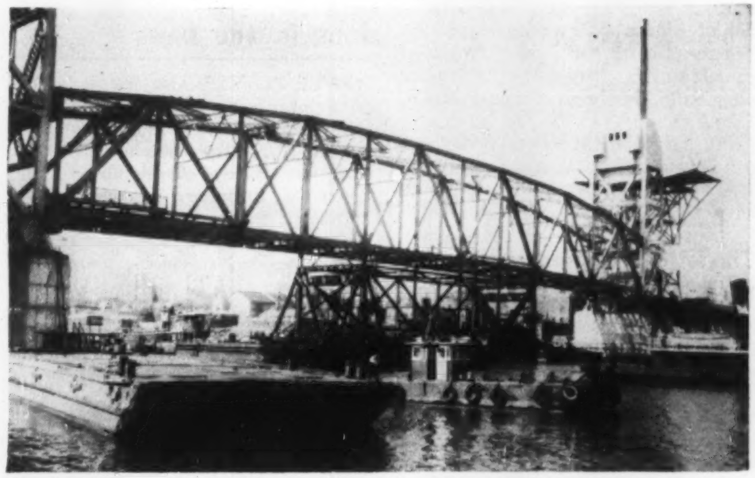
EJC sets up committee to study nuclear power

To foster peacetime uses of nuclear power, Engineers Joint Council has set up a General Committee on Nuclear Engineering and Science under the chairmanship of John R. Dunning, Dean of Engineering at Columbia University. Donald L. Katz, University of Michigan, is secretary.

The American Chemical Society, which is not a member of EJC, has joined with the eight engineering organizations in EJC in sponsoring this new activity, which is designed to help meet the pressing problems of nuclear engineering, especially those relating to the industrial use of atomic power.

Current plans of the committee call for holding a Nuclear Congress July 11-16, 1955, but such a congress will not be held if the United Nations decides to hold such a conference next year to consider the creation of a world bank of fissionable material for peaceful uses.

Representing civil engineering interests on the committee are Raymond J. Faust, executive assistant secretary of the American Water Works Assn., and Jewell M. Garrelts, professor of civil engineering at Columbia University.



LIFT SPAN for new bridge in New York City floats into position on barges. Anchor lines from barges to shore controlled closing operation.

New York builds a bridge to save money

New York City will eliminate a costly traffic bottleneck next April when a $6.4-million bridge between Queens and Welfare Island in the East River goes into service.

Welfare Island is the site of several major city hospitals with a combined bed capacity of 10,000 patients. Until now, access to the island has been provided only by a ferry from the Manhattan side of the river, and by elevators in the Queensborough Bridge which are capable of taking vehicles to the island but have been responsible for frequent traffic jams and accidents on the bridge.

All five lanes of traffic on the bridge have to be halted to allow vehicles to enter or to leave the elevator building. Traffic disruptions average about 800 a day. Elimination of this bottleneck will increase traffic capacity of Queensborough Bridge by about 10%.

In addition, the city expects to save about $176,000 annually—$125,000 that operation of the elevators now costs plus $96,000 for operation of the ferry, less $45,000 for upkeep of the new bridge.

The 418-ft lift span for the new bridge was floated into place last week. It will provide 100 ft clearance over mean high water in the up position and 40 ft in the down position. The bridge will be 2,300 ft long and carry three lanes of traffic. Work on approaches is virtually complete.

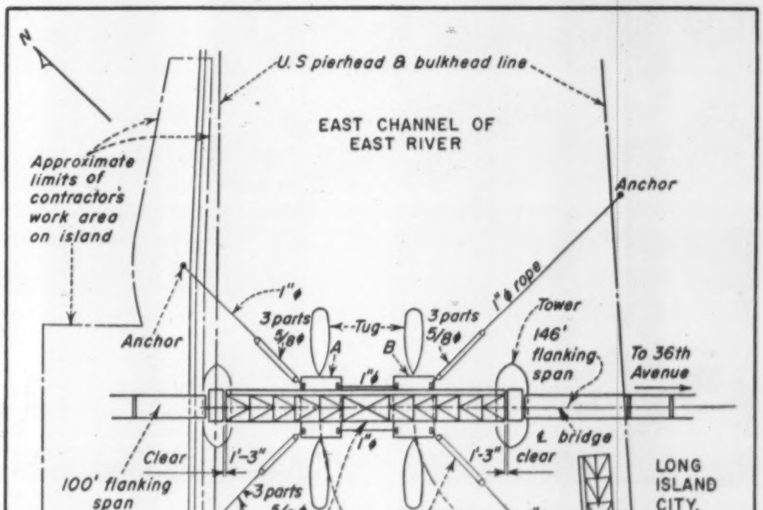
• Barges float span into place—The 418-ft lift span, weighing nearly 1,100 tons, was erected on two barges along the bulkhead wall at the Queens shore, then floated into place. (An earlier attempt, in July, was frustrated when one of the wooden barges developed a leak and sank. In last week's successful maneuver, a steel barge replaced the last wooden one.) The span was set 50 ft above mean high water temporarily, pending availability of electric power to operate the lifting machinery.

Each tower contains a 125-hp. ac motor for normal operation of the lift span, with a similar motor for synchronous control. Time for raising or lowering the span 60 ft will be 1½ min. For emergency operation at one-quarter speed, an independent power-feed system and 30-hp drive with synchronous-control motors have been installed in each tower.

• Record-size welded sheaves—Counterweights are metal boxes filled with concrete. Grooved counterweight sheaves, a pair of which are in each tower, are of welded construction, probably the largest to have been so fabricated. They are 15 ft in diameter and weigh 37 tons. Each sheave consists of two web plates, 1¾ in. thick by 14 ft 3 in. dia, and a rim rolled from two 36x6 in. billets. The hub is 3 ft in dia. Radial spokes, which stiffen the web, are made of 1½-in. material.

The new Welfare Island bridge is being constructed for the Department of Public Works, New York City, of which Frederick H. Zurmuhlen is commissioner. Construction is being supervised by J. Frank Johnson, director of bridges.

Knappen-Tippetts-Abbett-McCarthy, consulting engineers, New York City, designed the structure. William F. Moore Building Corp.-Lopier Construction Corp. is the general contractor with Carl Pierleone as managing partner in charge of the project. Harris Structural Steel Corp. fabricated and erected the steel for the crossing, and John N. Schnier was erection manager. Jandous Electric Construction Corp. is handling the electrical installations.


N
U. S pierhead & bulkhead line
EAST CHANNEL OF EAST RIVER
Approximate limits of contractor's work area on island
Anchor
1"ϕ rope
1"ϕ
3 parts 5/8ϕ
Tug
A
B
Tower
146' flanking span
To 36th Avenue
Anchor
1"ϕ
℄ bridge
Clear
1'-3"
1'-3"
clear
100' flanking span
3 parts 5/8ϕ
1"ϕ
3 parts 5/8ϕ
1"ϕ
Anchor
Bridge floated into position
WELFARE ISLAND
LONG ISLAND CITY, QUEENS
Barge B
Barge A
Anchor
Position of bridge as erected on false work truss

Coastal toll road

Virginia and N. Carolina award three contracts

Virginia and North Carolina Turnpike Authorities have awarded contracts for the construction of a 50-mi coastal toll roll connecting Virginia Beach, Va., and Nags Head on North Carolina's outer banks.

The awards are subject to sale of bonds which have been authorized to finance the facility.

No delay in the start of construction is expected. A $3,375,000 bond issue already has been guaranteed by the firm of Strader, Taylor and Company of Lynchburg, Va.

The road is expected to be constructed in less than 300 calendar days. Contract awards were made in three projects, as follows:

Project No. 1 (in North Carolina) –Brown-Coble Construction Co. of Lexington, N. C., for 24-ft pavement, 5-in. plant-mixed sand-asphalt over entire North Carolina section, $785,883.

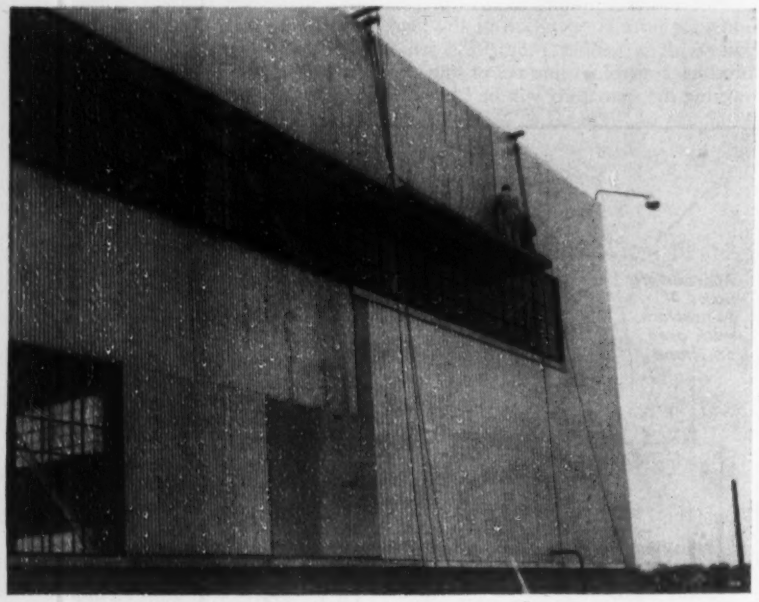
Project No. 2 (in Virginia)–E. V. Williams Co. Norfolk, Va., and W. H. Scott, Franklin, Va., construction of 4-in. subbase material and 4-in. clay-gravel base with 2-in. plant-mixed asphalt surface; road to be 24 ft wide from Sand Bridge to Virginia Beach, $724,630.

Project No. 3 (in Virginia)–Bridges and culverts, E. V. Williams Co. Norfolk, and W. H. Scott, Inc., Franklin, $86,031.

Consulting engineers named for 231-mi Kansas Turnpike

The Kansas Turnpike Authority has named consulting engineers for individual sections of its $140-million, 231-mi toll road project, for which Howard, Needles, Tammen & Bergendoff of Kansas City are consultants (ENR Sept. 16 p. 26).

The firms are: Harrington & Cortelyou and Truman Schlup, Kansas City; Wilson & Co., Salina; R. S. Delameter and Ediger Engineering Co., Wichita; Evans & McKee, Great Bend; Brink, Dunwood & Rector, Finney & Turnispeed, Servis-Van Doren & Hazard, and Paden & Bartlet, Topeka; Burgwin & Martin, Fredonia; Rayomond W. Campbell, Merriam; and Shaver & Kline, Overland Park.



A new look for industrial buildings

Sandwich panels with a stainless steel outer facing are being assembled in place to form the outer walls of a large industrial building for Joseph T. Ryerson & Son, Inc., in Jersey City, N. J. The panels consist of an inner facing of corrugated galvanized steel, 1-in.-thick insulation board and 26-ga fluted stainless steel. They were fastend to the steel frame of the building with high-speed stainless steel sheet metal screws or machine screws with nuts. Cost of the wall is estimated at $2.20 to $2.40 per sq ft. The building consists of two integrated units, 110x605 ft and 85x180 ft, by 40 ft high. A building of the same type, 200x800 ft, was completed in Milwaukee for Ryerson earlier this year.

American Steel Band Co., Pittsburgh, fabricated the stainless steel wall, and Donovan Erection Co., Hillside, N. J., erected the New Jersey plant.

Jobs in the news

POWER PLANTS–Two new steam generating plants are scheduled for the South. Construction will start this fall on a $26.4-million, 225,000 kw addition to the Glen Lyn, Va., plant of Appalachian Electric Power Co. Engineered by American Gas & Electric Service Corp., the new unit will more than double the generating capability of Appalachian Electric. Next spring, Duke Power Co., Charlotte, N. C., will start construction of the first unit of a new $24-million plant on the Catawba River, near Belmont, N. C. The plant will ultimately have a continuous capacity of 1,000,000 kw. The project includes a mile-long tunnel through which condensing water for the generating unit will be drawn and later discharged to South Fork River.

OFFICE BUILDING–A new 17-story office building, which will utilize the existing steel framework of the building it replaces, will be erected by Moses Ginsberg & Sons on Madison Ave. at 58th St., New York City. Containing 400,000 sq ft of office space, the structure will incorporate a year-round peripheral system of air-conditioning and will have aluminum facades on each of its three street sides. Estimated cost of the building is $10 million. Diesel construction Co., New York, is general contractor; Sylvan Bien, New York, is architect; Michael Saphir Associates, New York, is office-layout consultant.

Michigan orders survey for 115-mi toll highway

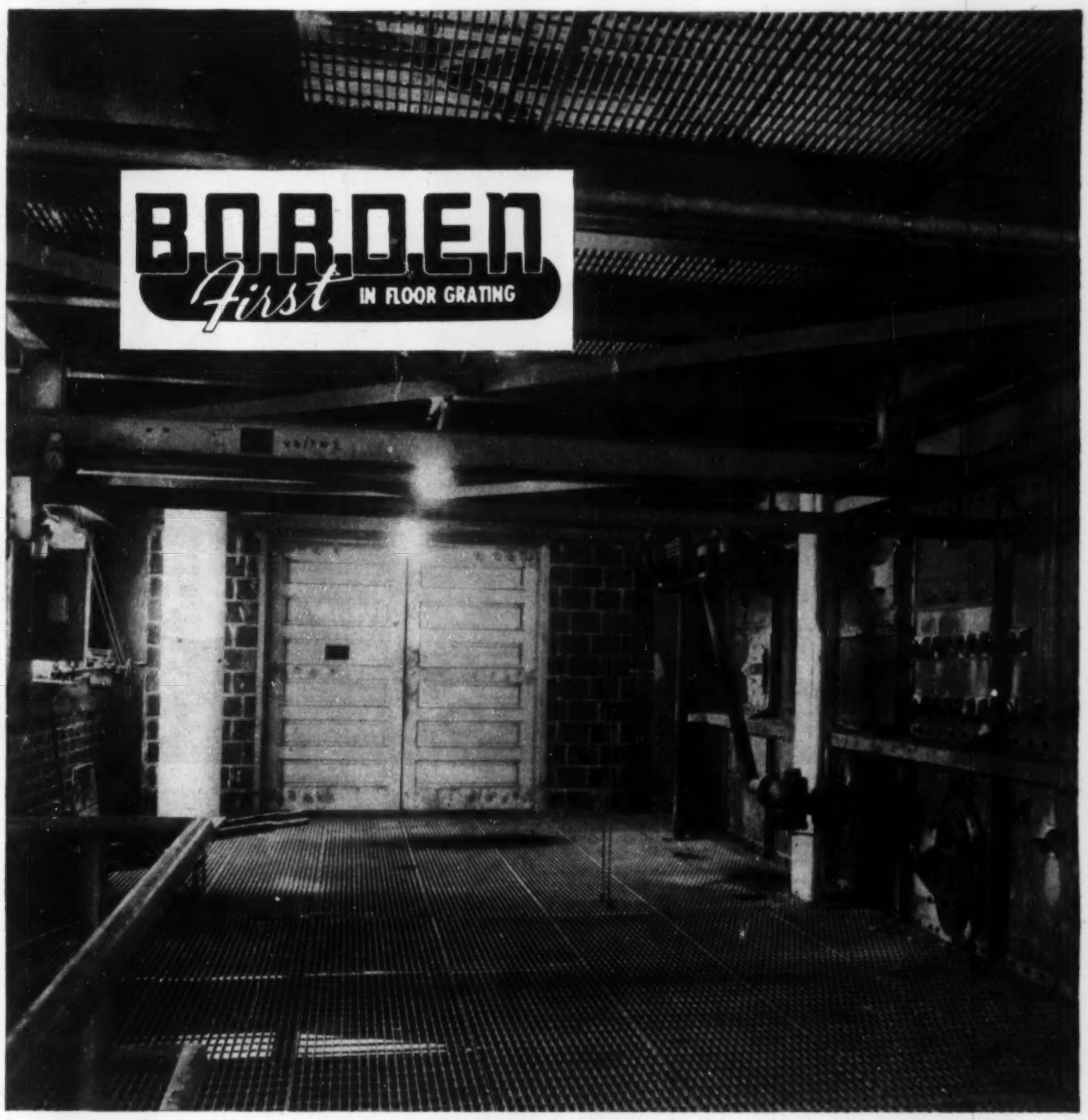
Michigan Turnpike Authority has ordered a detailed survey for a 155-mi. toll road from Rockwood, south of Detroit, to Saginaw. J. E. Greiner Co., Baltimore consulting engineers, will make the survey.

The Rockwood-Saginaw highway is the center section of the proposed Toledo-Bay City turnpike on which Coverdale & Colpitts, New York engineers, submitted a traffic and revenue report to the Michigan Turnpike Authority last week.

This report found construction of the center section of the turnpike economically feasible but recommended against building the two end sections –from the Ohio line to Rockwood and from Saginaw to Bay City.

Total cost of the Rockwood-Saginaw stretch is estimated at $186 million. Construction costs alone would be $154 million. The J. E. Greiner Co.'s detailed report is expected to be completed by March 1. The authority plans to sell bonds for the project by April 1 and let construction contracts late in 1955.

Construction may begin in the spring of 1956 with completion of the road scheduled for mid-1958.



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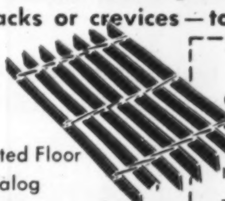

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1953-54 ANNUAL REPORT ON

Construction Costs

BY ENGINEERING NEWS-RECORD

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THE COLD war between more competitive bidding and higher prices and wages warmed up this year. Competition got hotter, prices and wages went higher. Contractor failures increased sharply but not disastrously.

Thus knowledge of costs is more and more a tool of management, a basis of safe as well as "successful" bidding—In addition it affords a positive means of increasing job productivity.

How a contractor improved labor relations by means of construction cost competition between units, how the highway engineers analyze bid prices, how rough unit prices help preliminary planning and what actual bid prices land contracts—these and more applications of construction costs knowledge are reported in the pages which follow.

This knowledge of costs improves each year. It becomes more of a science in addition to being a fine art.

The '55 Outlook for Construction Costs

• **Productivity** is going to be the password to attainment of any kind of comfortable relationship with construction costs for the foreseeable future. Costs of labor and materials are up 4% to 5% against the predicted 2% due mainly to the serious lumber strikes in the Northwest. But the steel price rise and cement price increases also contributed to the increased momentum of the cost upturn.

Bid prices, on the other hand, are 4.5% to 23% below their peaks of 1952 and '53. Bids in 1954 have run 10% to 20% and more under engineers' estimates. This leaves money in the kitty for more construction that will show up in more calls for bids, at least by highway officials, but it puts a heavy premium on good management at both office and field levels if the contractor failure record is to be kept low.

The continued pressure for higher wages and more benefits can be met under today's conditions only by increased output. One of the features of this issue is a report on how labor cooperation was enlisted to reduce unit costs. Also in the union wage pages is a report on the sharp upturn in work stoppages and man-days lost because of them. Better labor relations can be one of the roads to the better-productivity goal.

• **Unit prices** are reported here in several forms. Those bid by contractors reflect the job-hungry situation that prevails this year in the midst of some of the greatest plenty the construction industry has ever known. More contractors in the market, each with more capacity to take on work and finish it faster, have created a price war that is putting an emphasis on cutting costs that hasn't been experienced in two decades.

Here again the keystone is output, and one of the features in the pages which follow is an analysis of fixed and variable equipment costs, which shows how rapidly increased output reduces unit costs. These costs show also how rapidly equipment piles up non-productive charges by just standing idle. Here is another area where good management can shave the pennies off costs to produce unit prices low enough to land contracts in today's market, but with a profit margin to spare.

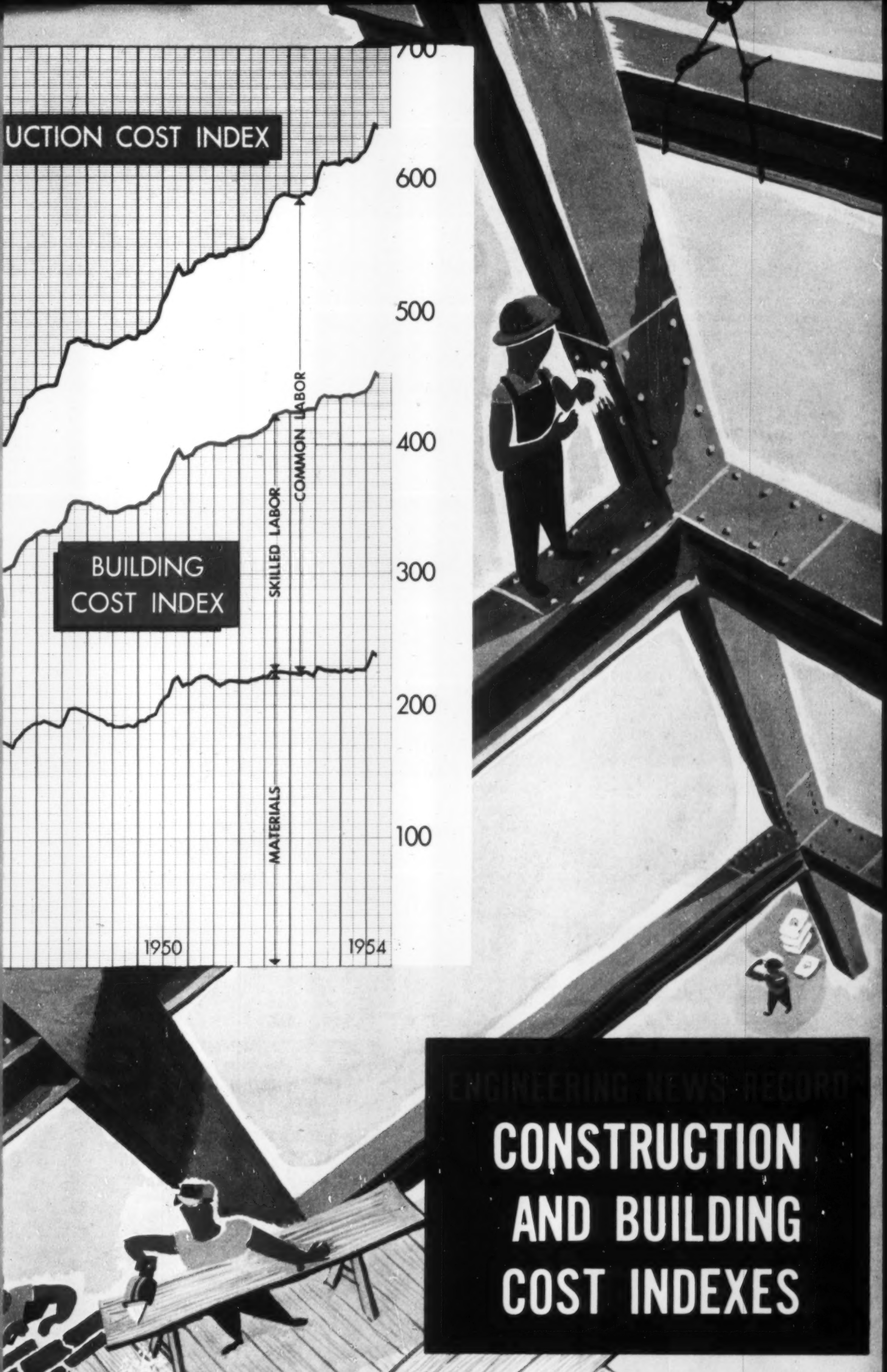
• **Financing** is plentiful, and interest rates and bond yields have drifted downward for the past year.

• **Compensation insurance** rates dropped 9% in New York. But permanent total injuries on construction increased 12.5%, temporary total injuries increased 3/10%. Permanent partial injuries, however, decreased 13%. Better safety offers another place where pennies saved on insurance rates per dollar of payroll add up on the profit side.

• **Respect for the men** who know their construction costs will grow as you study the pages which follow. The awesome variety of conditions they must meet and the diversity of equipment and materials they must master are merely suggested here.

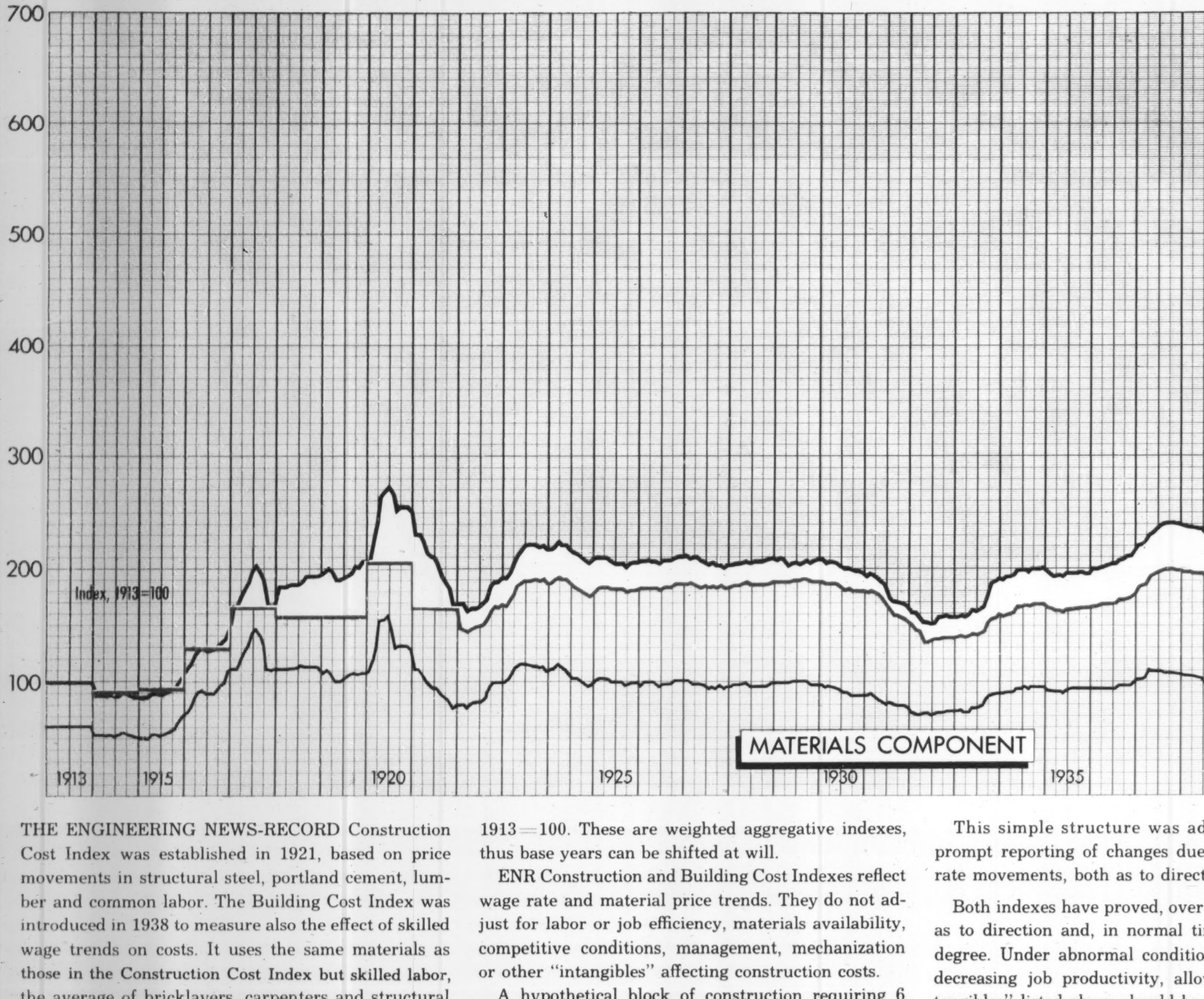
• **New construction projects** continue to pour into the market in record volume. An upturn of 6% over the 1954 rate for putting heavy construction under contract is forecast for 1955. The backlog of proposed construction is $77 billion and still growing. This means the strongest kind of support for the increased rate of calling for bids.

• **The cost rise momentum** increased this summer. But examination of the new Petit Net Change Curve on the chart insert in this issue shows that both duration and degree are narrowing in these momentum speedups and slowdowns. The trend stays up, but it could hold to a 2% to 3% range this coming year barring major work stoppages.



ENGINEERING NEWS-RECORD

CONSTRUCTION AND BUILDING COST INDEXES



THE ENGINEERING NEWS-RECORD Construction Cost Index was established in 1921, based on price movements in structural steel, portland cement, lumber and common labor. The Building Cost Index was introduced in 1938 to measure also the effect of skilled wage trends on costs. It uses the same materials as those in the Construction Cost Index but skilled labor, the average of bricklayers, carpenters and structural ironworkers, instead of common labor.

A few minor changes have been made in these indexes over the years necessitated by changed conditions in the market. These are recorded in full, together with a complete history of this development and use in ENR, September 1, 1949, page 398. New values are reported at the beginning of each month, based on 1913 = 100. These are weighted aggregative indexes, thus base years can be shifted at will.

ENR Construction and Building Cost Indexes reflect wage rate and material price trends. They do not adjust for labor or job efficiency, materials availability, competitive conditions, management, mechanization or other "intangibles" affecting construction costs.

A hypothetical block of construction requiring 6 bbls of cement, 1.088 M ft bm of lumber, 2,500 lbs of steel and 200 hours of common labor is used in the Construction Cost Index to measure the trend of the cost of heavy construction.

The Building Cost Index is based on a similar hypothetical block using the same quantities of materials, but 68.38 hours of skilled labor.

This simple structure was ad
prompt reporting of changes due
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Both indexes have proved, over
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News-Record, 330 West 42nd St., N

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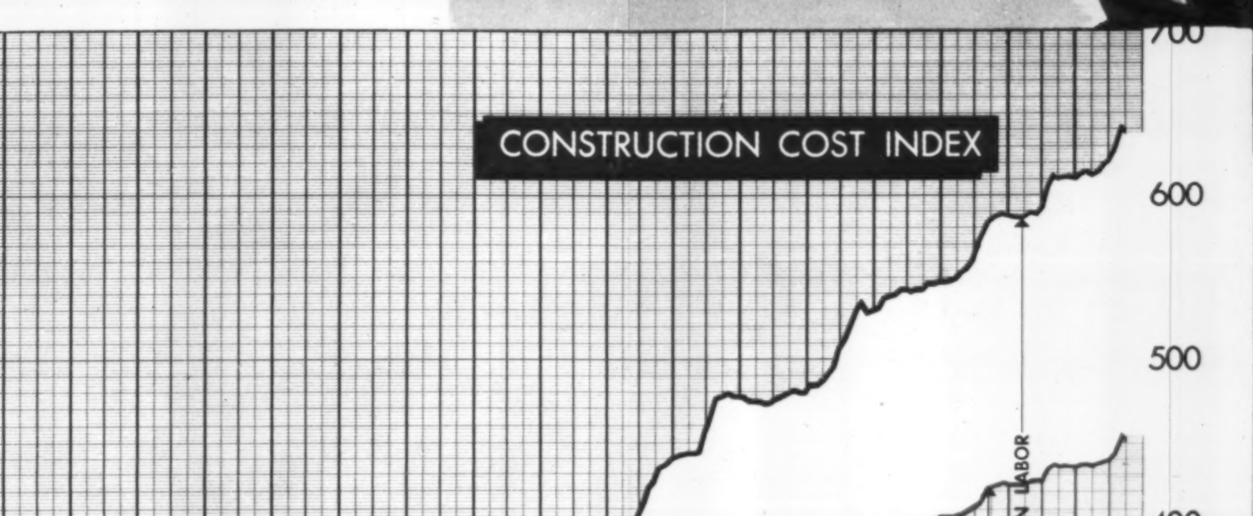

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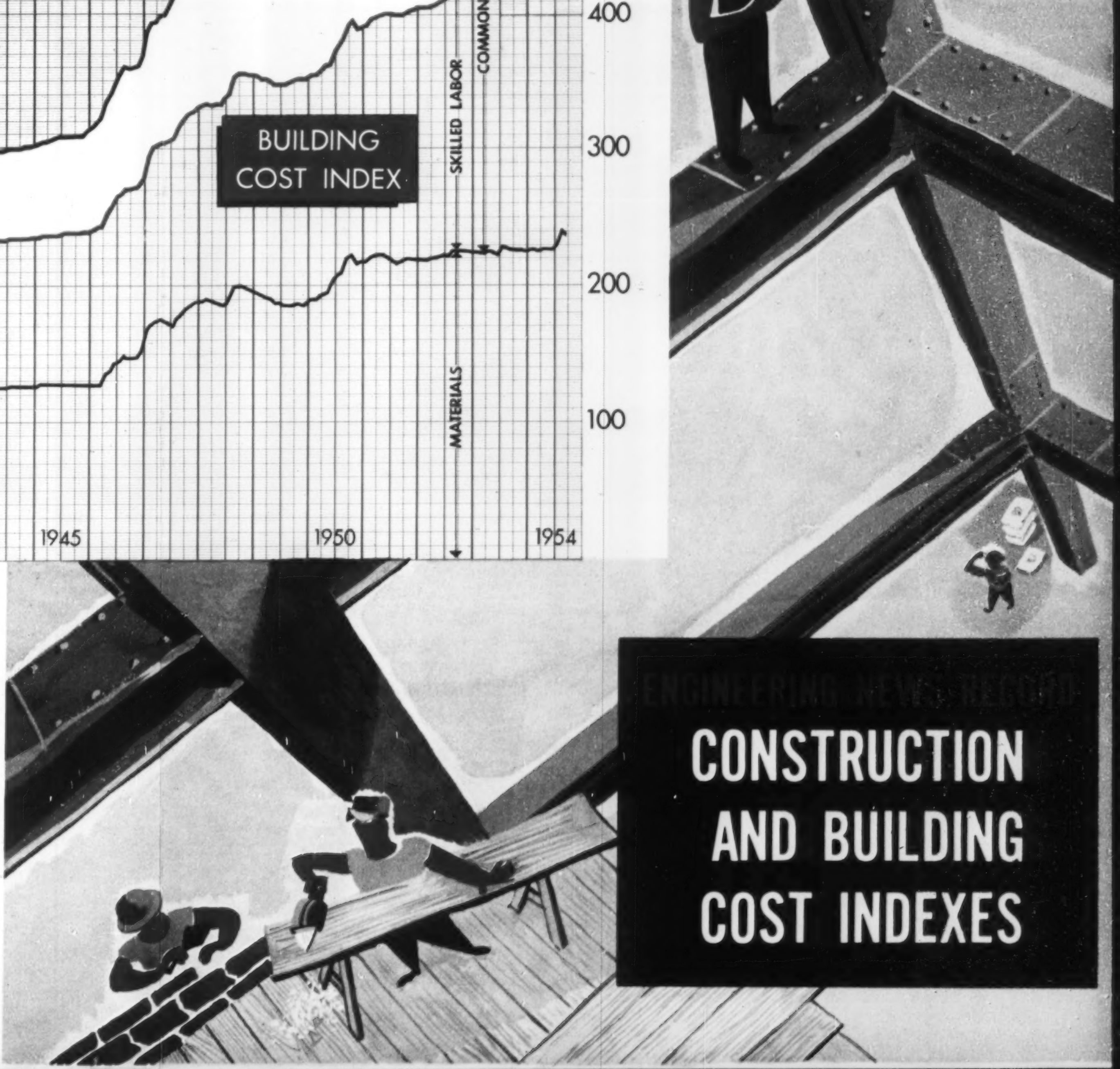
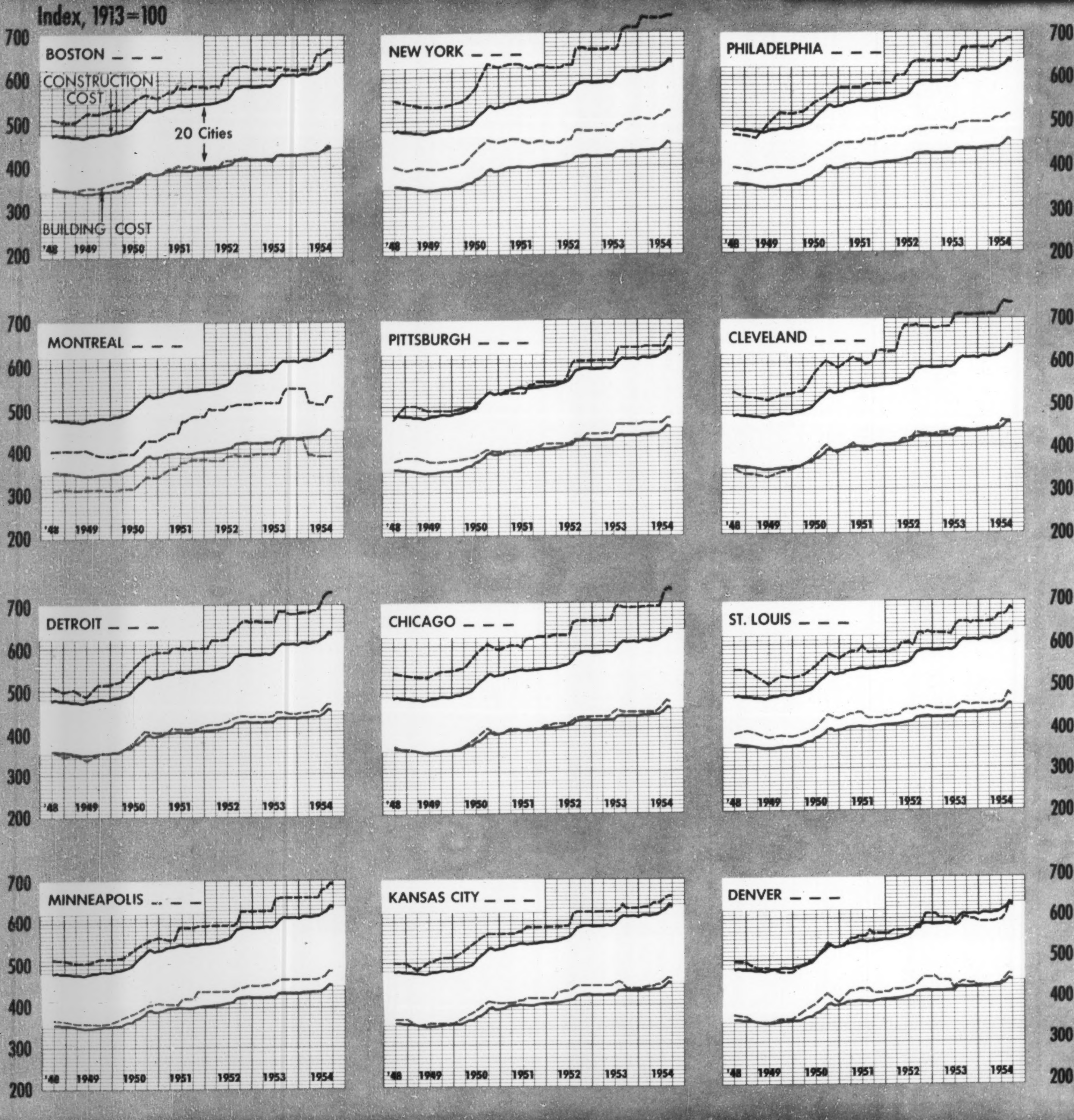


ENGINEERING NEWS-RECORD

CONSTRUCTION AND BUILDING COST INDEXES


Index, 1913=100
700
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400
300
200
BOSTON – – –
CONSTRUCTION COST
20 Cities
BUILDING COST
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PHILADELPHIA – – –
MONTREAL – – –
PITTSBURGH – – –
CLEVELAND – – –
DETROIT – – –
CHICAGO – – –
ST. LOUIS – – –
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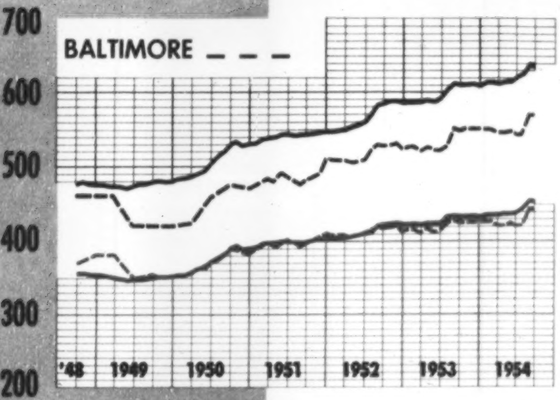
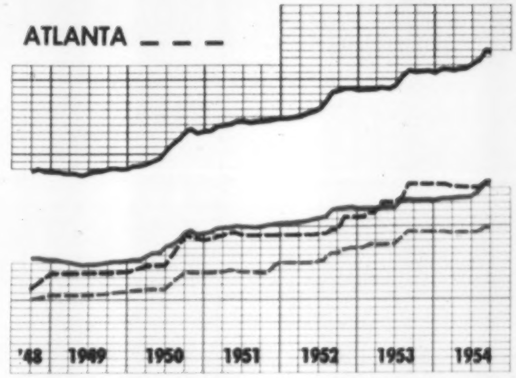
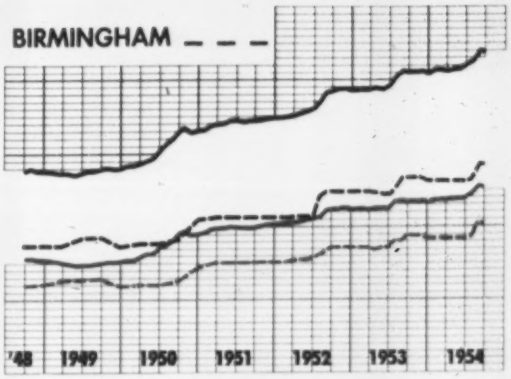
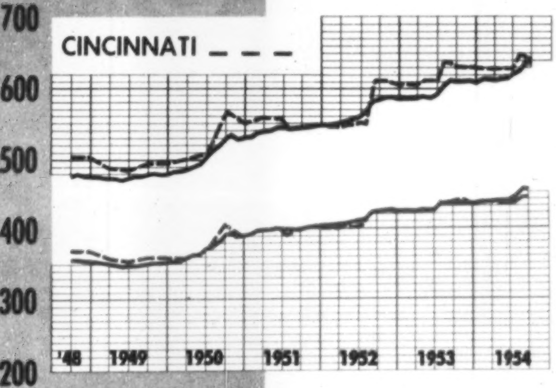




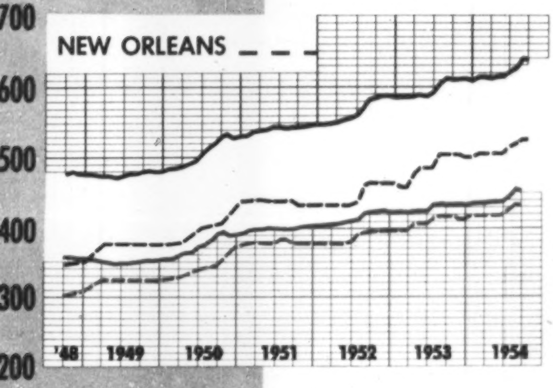


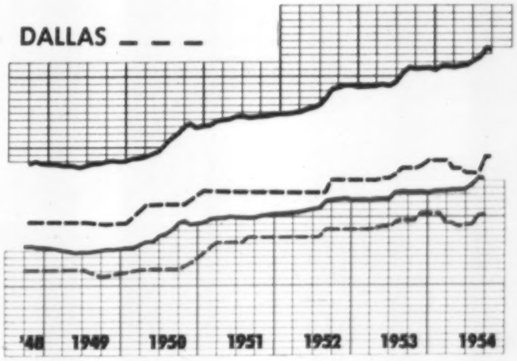


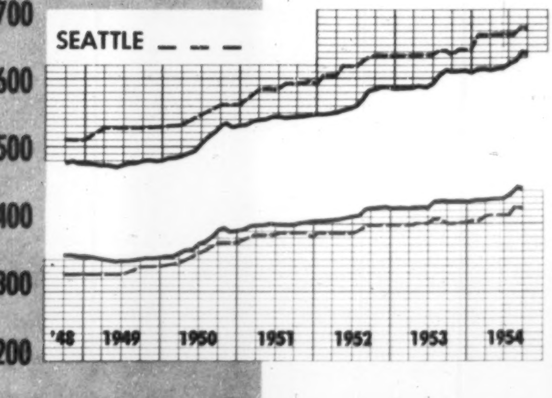
ENR Cost Indexes in 21 cities

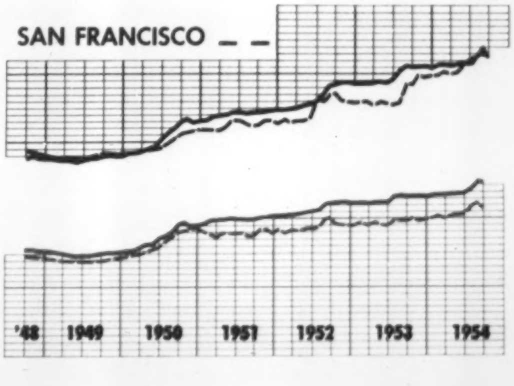
Components of Construction Cost Index and weighting in U.S. cities are: 25 cwt structural steel shapes, base mill price; 6 bbl portland cement, bulk, 1.088 Mfbm 2x4, S4S lumber, 200 hr common labor, at local prices. In Montreal, warehouse price of steel has to be used, so 15 cwt is weighting for steel. Price of Canadian steel is used prior to Oct. 1949 – the average of Canadian and U. S. steel prices is used after devaluation of Canadian dollar in Oct. 1949. Cement weighting is 10 bbl. Other elements are same as for U. S. cities. Components of Building Cost Index and weighting are same but 68.38 hr skilled labor is used instead of common labor.

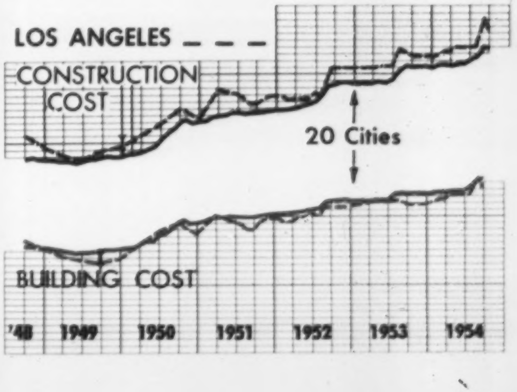
These ENR Cost Indexes measure movements in the cost to contractors and engineers of construction materials and labor. They do not adjust for productivity. Where major differences between cities occur, the main reason is found usually in wage differentials. Lower wages are often accompanied by lower productivity, hence allowances for job productivity should be made in estimating end-product-price, or construction-selling-price trends based on the cost trends shown here.

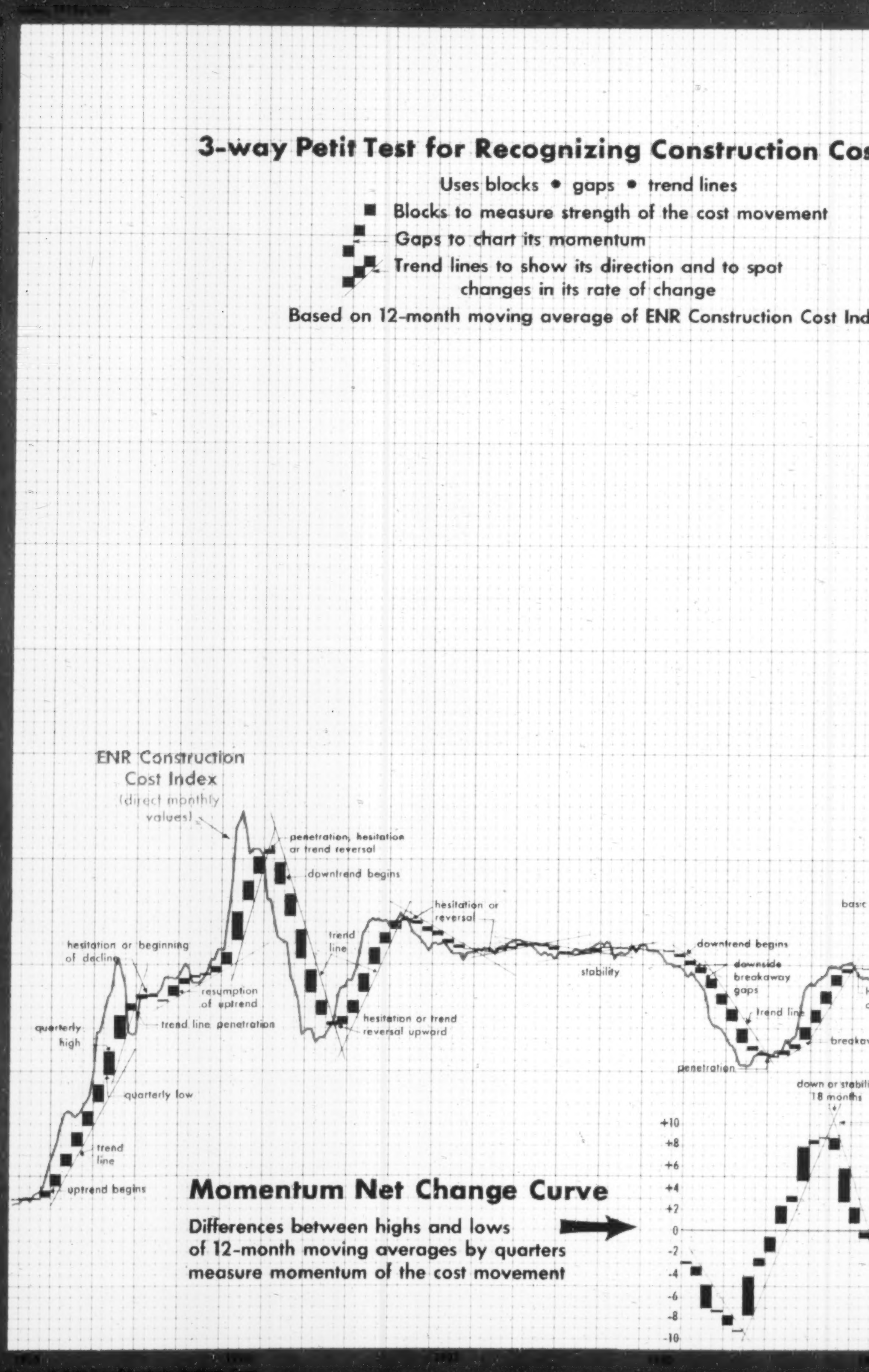












3-way Petit Test for Recognizing Construction Cos

Uses blocks • gaps • trend lines

Blocks to measure strength of the cost movement

Gaps to chart its momentum

Trend lines to show its direction and to spot changes in its rate of change

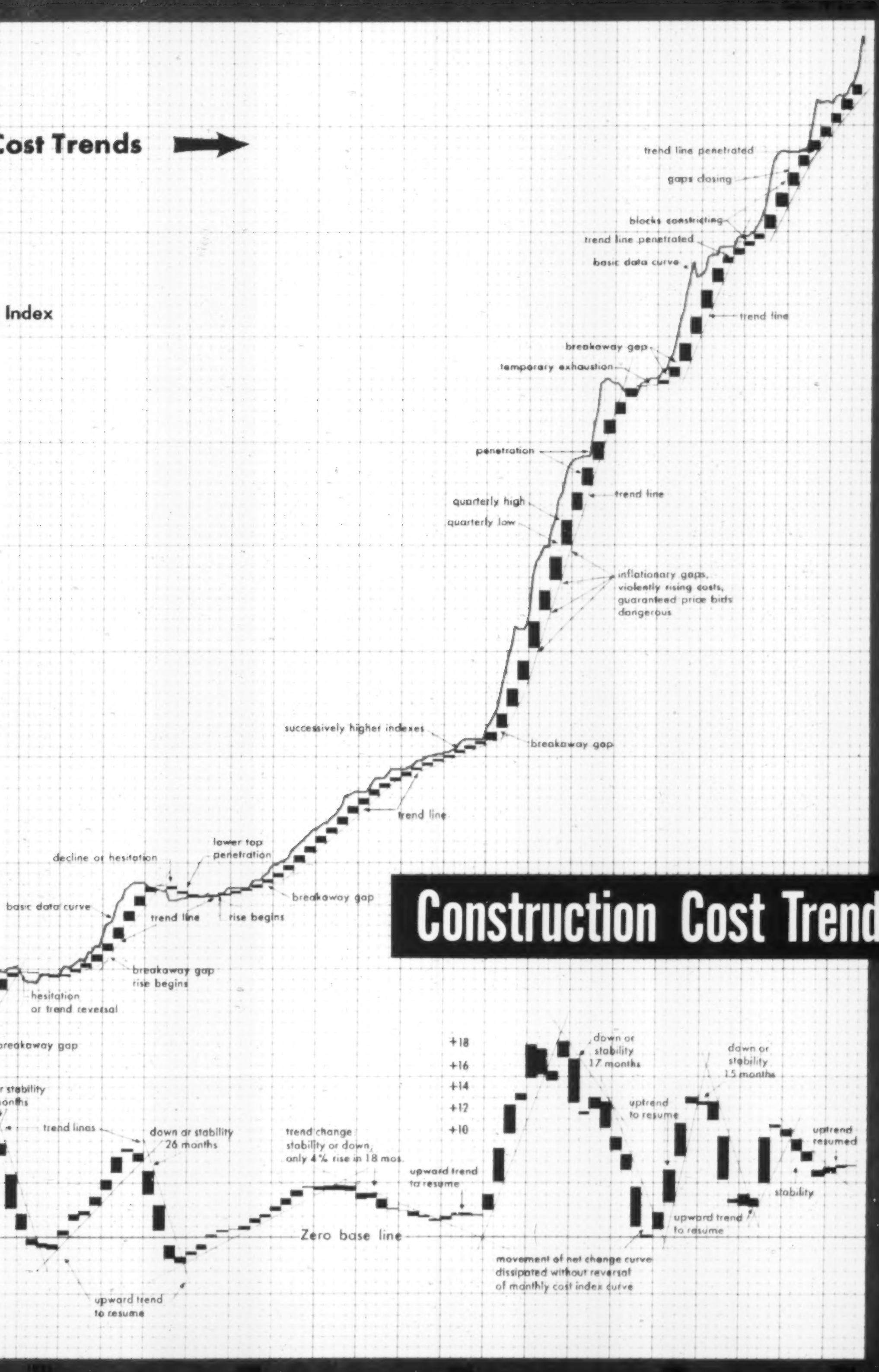
Based on 12-month moving average of ENR Construction Cost Ind

Momentum Net Change Curve

Differences between highs and lows of 12-month moving averages by quarters measure momentum of the cost movement

ENR Construction Cost Index (direct monthly values)
penetration, hesitation or trend reversal
downtrend begins
hesitation or beginning of decline
resumption of uptrend
trend line penetration
trend line
hesitation or trend reversal upward
hesitation or reversal
stability
downtrend begins
downside breakaway gaps
trend line
penetration
breakaw
basic
quarterly high
quarterly low
trend line
uptrend begins
down or stabili 18 months
+10
+8
+6
+4
+2
0
-2
-4
-6
-8
-10

Construction Cost Trends



Cost and Price Indexes

Buildings

TWO KINDS OF INDEXES ARE RECORDED HERE: 1, the cost indexes, which measure the trend in cost to the contractor of labor and materials.

2, the price indexes, which measure the trend in the price charged by the contractor for the finished building.

Aberthaw Co., Boston, Mass.—Since March 31, 1946, a composite of 36 major cost items in three multi-story and two one-story New England industrial buildings, including all mechanical trades. Repriced quarterly using actual and estimated labor and material costs. Base: 1914=100. (Prior to March 31, 1946, based on New England seven-story and basement, 62'4" x 202'4", reinforced concrete building built in 1914.)

American Appraisal Company, Milwaukee, Wis.—Based on detailed analysis of materials and labor required for four types of buildings (frame, brick, concrete and steel) in 30 representative cities. Corrects for labor productivity but assumes normal average conditions and does not recognize overtime or bonus payments to labor or premiums paid for materials in individual cases or under temporary abnormal conditions. Applies to construction only, does not include plumbing, heating, lighting, sprinklers, fixtures and decorations. 1913=100. For values in 22 cities see accompanying page

Associated General Contractors of America (AGC), Washington, D. C.—Wages and materials for 12 cities combined in 40-60 ratio. Wages, prevailing rates for hod carriers and common labor. Materials, weighted: sand, gravel and crushed stone, 1; cement, 1; lumber, 1; hollow tile, ½; structural and reinforcing steel, ½. 1913=100

Austin Co., Cleveland, Ohio.—Reprices typical one-story, steel frame, monitor type industrial building. Includes concrete foundations; brick curtain walls; continuous steel sash; concrete floor laid on ground; 2-in. wood roof deck on timber purlins covered with 4-ply waterproofing, monitor sash with mechanical operators, but no heating, lighting, plumbing, sprinkler or other services. Priced quarterly for central and eastern states. 1926=100

E. H. Boeckh & Associates, Inc., Washington, D. C.—Current indexes are calculated upon an actual survey at source of local construction cost conditions. Material prices used are those paid by contractors to material dealers. Labor rates are current rates paid by contractors—certain corrections being made in certain areas for labor efficiency and labor shortage. Index includes construction overhead, sales taxes, compensation insurance and social security. Base 1926-'29=100. Special purpose indexes are reported monthly for ten classes of buildings in 47 cities

Boeckh index shown in these charts is the national average for all five Boeckh commercial and factory building indexes, converted to 1913=100

Fruin-Colnon Contracting Co., St. Louis, Mo.—Industrial plant of five buildings in St. Louis repriced monthly on basis of contractor's actual and estimated material and labor costs. 1913=100, 1926=100 both used as bases

George A. Fuller Co., New York, N. Y.—Composite of 36 major cost elements, in three commercial type buildings, including mechanicals, elevators, wiring, heating and ventilating, repriced. 1913=100

Marshall and Stevens, Inc. of Illinois, Chicago, Ill.—Indexes cover both comparative building costs, 1902 to date, and comparative equipment costs, 1913 to date. For industrial equipment costs see accompanying page. The building indexes are national averages with a system of modifiers to get regional and municipal values for each of four types of building: A. Fireproof, protected steel, B. Fireproof, reinforced concrete, C. Masonry buildings, D. Frame. They reflect normal costs in line with recognized or published prices of building materials, equipment and labor. Extraordinary or intangible conditions are not included. 1926 = 100

Smith Hinchman & Grylls Inc., Detroit, Mich.—Actual in-place costs, using building material costs, freight rates, skilled and unskilled labor rates and including labor efficiency and premiums, bidding competition, contractor profit margins and overhead. Figured with the contractor overhead are taxes, duration of projects, material expediting and labor procurement. Reported monthly. 1926 = 100

Turner Construction Co., New York, N. Y.—Eastern cities. Own cost experience on labor rates, material prices, productivity of labor, efficiency of plant and management, competitive conditions, forecast of price trends. 1939 = 100

Railroad Construction Cost Indexes—Released annually, by Engineering Section, Bureau of Valuation, Interstate Commerce Commission, Washington, D. C., include items developed from analysis of major construction contracts over a period of years. 1910-1914 = 100. The series for stations and office buildings is used in the charts

Handy-Whitman, Whitman, Requardt & Associates, Inc., Baltimore, Md.—Public utility cost indexes for 14 items of building construction, 17 items of gas plant construction and 64 items of electric light and power construction in six regions. Selected items are shown in a table on an accompanying page. 1911 = 100, 1911-14 = 100. The series used in these charts is for reinforced concrete building in the Pacific Division

Indexes reported on 1926=100, 1926-29=100 and 1939=100 are converted to a 1913 base for plotting on these charts

Highways

WEIGHTED AGGREGATES OF AVERAGE BID PRICES

Connecticut State Hwy. Dept.—Composite index combines separate indexes weighted this way: 33% of structures index; 26% trunk lines; 20% concrete pavement; 13% grading, drainage; 8% town aid. A representative project is priced for each category. Based on 1939=100

Pennsylvania Dept. of Hwys.—Weighted aggregate of average unit prices. Based on major items of a typical road project constructed in 1940: cl 1 & cl 2 excavation; 8" cr aggr base course; bit surf course DP-1; 9" RCC pavement; "A" concrete; "B" concrete; reinf steel. Based on 1940=100

California Div. Hwys.—Weighted aggregate of average contract prices for: roadway excavation, cr run base (1940-52) and untr rock base (1953 on); plant mix surface; asph conc pavement; PCC pavement; PCC structures; reinf steel; str steel. Based on 1940=100

Mississippi Hwy. Dept.—Weighted aggregate of average unit bid prices on highways and bridges. Items: excavation & topping incl haul; "B" culv concrete; conc pavement incl plain and RCC; bit pavement & cover; gravel; structures incl "B" & "C" bridge concrete, br reinf steel, str steel, tr timber & piling, steel piling. Based on 1937-41 av unit prices=100, weighted by 1938-41 quantities. 1940 index=100

Oregon Hwy. Dept.—Weighted aggregate of average unit bid prices for: grading, cr rock surface, bit mac surface, asph conc pavement, PCC pavement, conc bridges structures. Based on average quantities and prices in 1940=100

Washington Hwy. Comm.—Average unit prices for 11 items weighted by average quantities in 1946-49. Includes common, uncl & struct rock excavation; ballast; cr stone surf base, cr stone surf top, asph conc I-1; 8" cmt conc pvmt; "A" bridge concrete, bridge & culv reinf steel; str steel. Based on 1940=100.

Texas Hwy. Dept.—Weighted aggregate of average bid prices for 11 items. Weights based on a project costing $100,000 in 1949. Items include: roadway excavation incl borrow & haul, sprinkling, rolling, flex base, asphalt, aggregate, conc pavement, bit paving mix, "A" concrete, reinf steel, str steel. Index is calculated monthly, quarterly, and annually. District indexes calculated annually. 1949=100

COMPOSITE MILE INDEXES

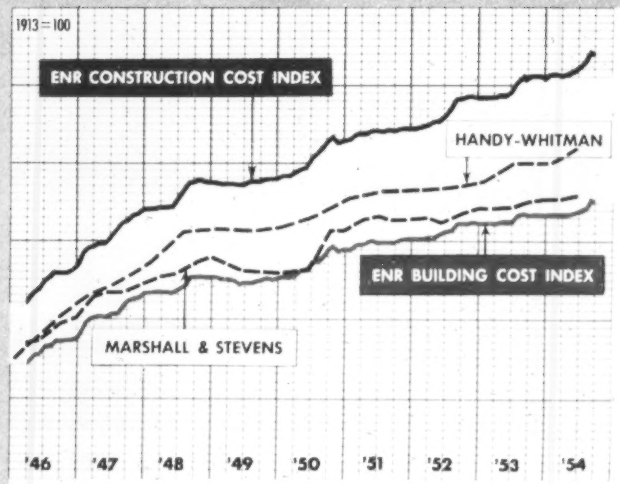
Colorado Dept. of Hwys.—Average bid prices for 24 items are weighted by average quantities per mile during 1949-53. Index is computed by dividing average mile cost by average cost in 1949. Includes: uncl & struct excavation; rolling; wetting; overhaul; subbase; grav cr rock surf; asphalt; road mix process; stone screenings; plant mix asph surface; conc pavement; bridge timber; concrete, reinf steel, str steel, RCC pipe, CM culv, barbed-wire fence, sewer pipe

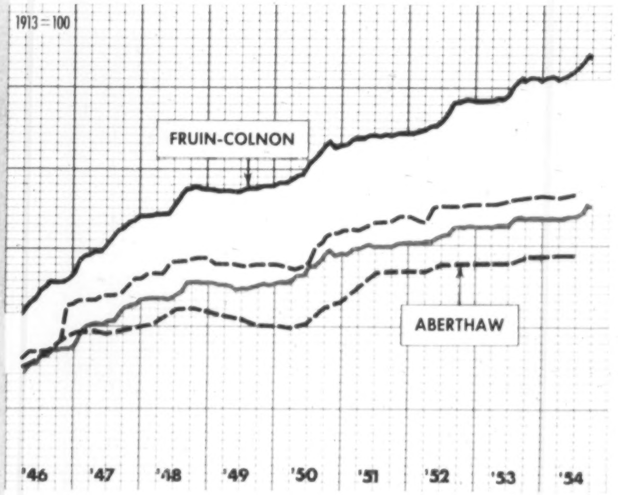
Minnesota Dept. of Hwys.—Weights average bid prices by average quantities used in 1948. Includes excavation, pavement, str steel, str concrete, cr run bases, road mix bit surface, plant mix bit surface. Index is corrected for design changes, differences in haul & other variables. Based on 1940=100

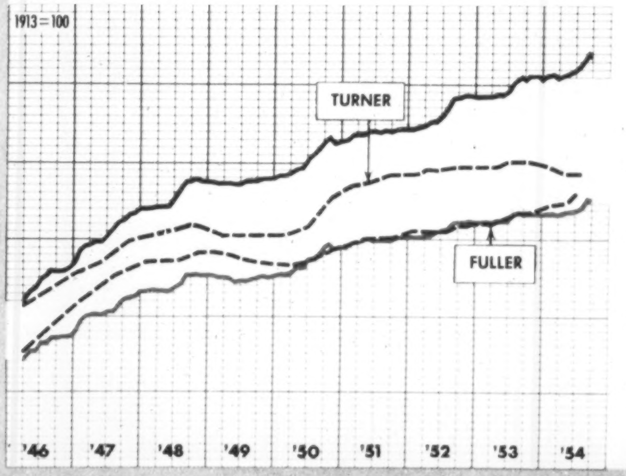
U. S. Bu. of Public Roads—Average bid prices on federal-aid-highways are weighted by quantities per mile of common excavation, concrete pavement, reinf steel, str steel, str concrete. Index is adjusted for design improvements. Based on 1925-29=100

Indexes based on 1925-29=100, 1939=100 and 1940=100 are converted to a 1949 base for plotting on these charts

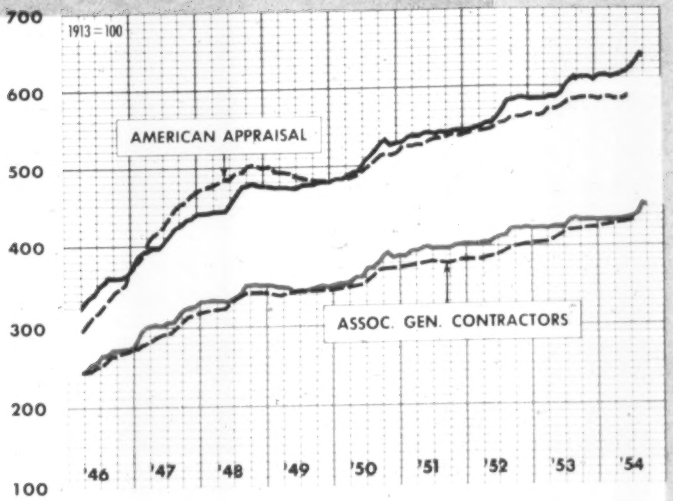
Buildings

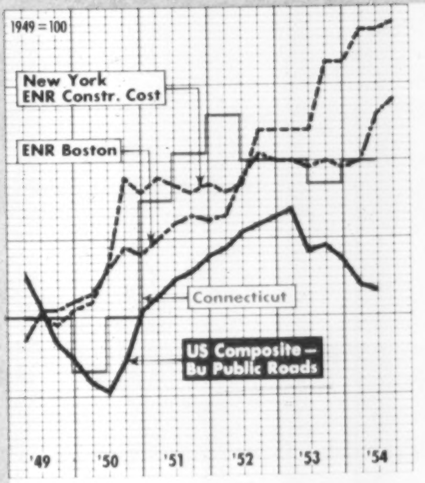


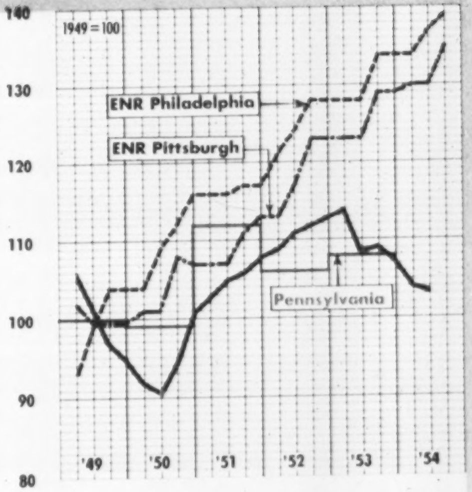


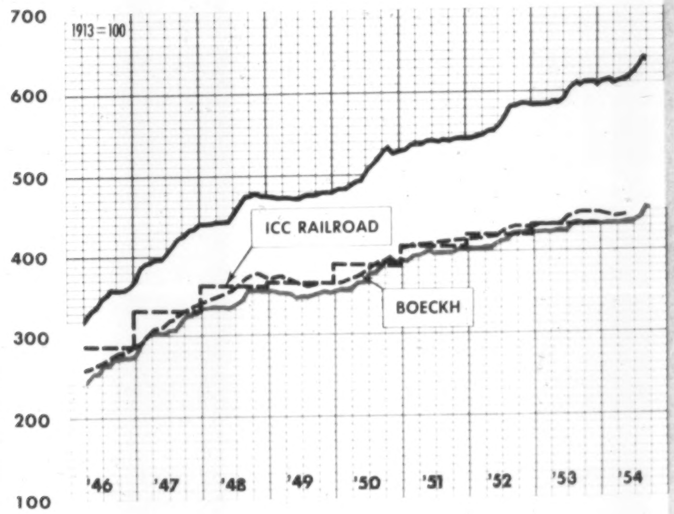


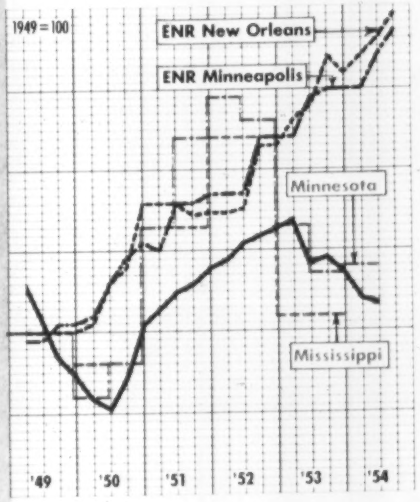
Highways

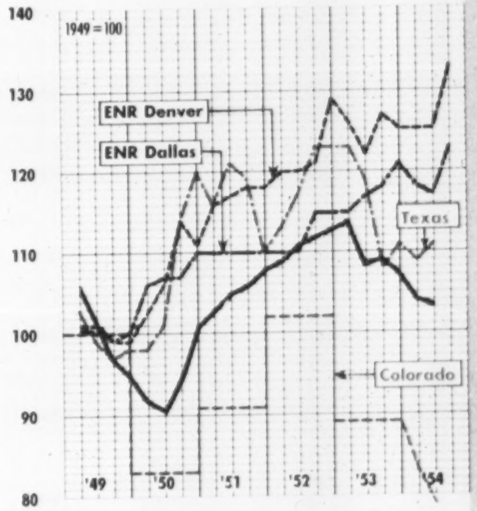

1913 = 100
700
600
500
400
300
200
100
AMERICAN APPRAISAL
ASSOC. GEN. CONTRACTORS
'46
'47
'48
'49
'50
'51
'52
'53
'54

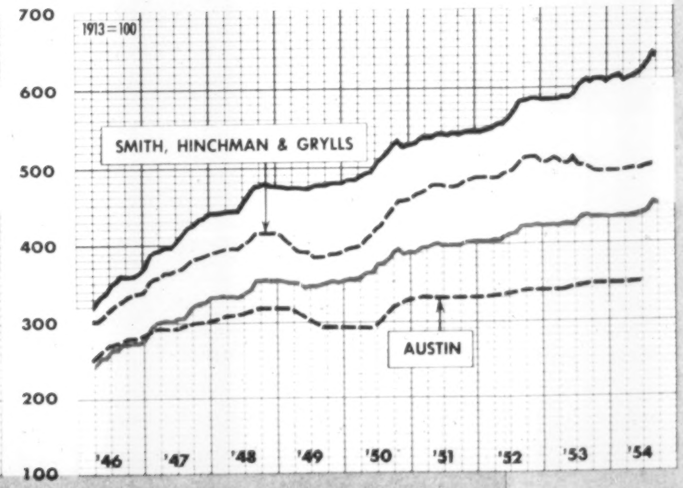

1949 = 100
New York
ENR Constr. Cost
ENR Boston
Connecticut
US Composite –
Bu Public Roads
'49
'50
'51
'52
'53
'54

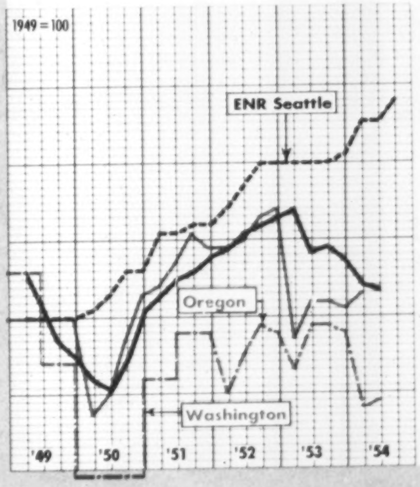

1949 = 100
140
130
120
110
100
90
80
ENR Philadelphia
ENR Pittsburgh
Pennsylvania
'49
'50
'51
'52
'53
'54

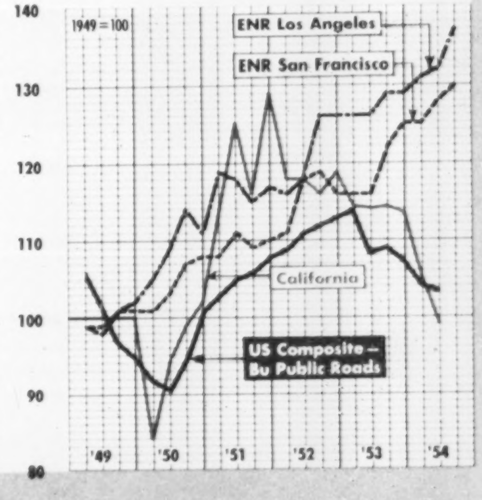

1913 = 100
700
600
500
400
300
200
100
ICC RAILROAD
BOECKH
'46
'47
'48
'49
'50
'51
'52
'53
'54


1949 = 100
ENR New Orleans
ENR Minneapolis
Minnesota
Mississippi
'49
'50
'51
'52
'53
'54


1949 = 100
140
130
120
110
100
90
80
ENR Denver
ENR Dallas
Texas
Colorado
'49
'50
'51
'52
'53
'54


1913 = 100
700
600
500
400
300
200
100
SMITH, HINCHMAN & GRYLLS
AUSTIN
'46
'47
'48
'49
'50
'51
'52
'53
'54


1949 = 100
ENR Seattle
Oregon
Washington
'49
'50
'51
'52
'53
'54


1949 = 100
140
130
120
110
100
90
80
ENR Los Angeles
ENR San Francisco
California
US Composite –
Bu Public Roads
'49
'50
'51
'52
'53
'54

New cost predictor flags upturn

The construction cost uptrend has resumed but, for the first time since 1945, we are in a situation which can erupt into a violent price movement – either up or down. This is how George H. Petit interprets the 1954 reading of his new moving average net change curve shown here with both its parent trend prediction curve and the basic construction cost index.

This added tool for predicting changes in cost trends not only puts a magnifying glass on the speed-up or the slow-down in the momentum of each stage in the cost rise (or fall) but it catches each turning point at its very beginning.

All three curves together now predict continued uptrend. The ability of the basic index line to remain above the moving average curve is one strong indicator. Should its September, 1954 turn-down from the sharp August rise continue until it crosses the moving average blocks, a cost decline would be in progress. The nearest approach to this condition was in 1949. Then also the net change curve got mighty close to its zero base line. But the uptrend resumed before either crossed.

While the net change curve stays on the plus side of the zero base line, costs are still moving up. Should it turn down and cross to the minus side, a cost decline will have set in.

Note from the slope of the trend lines on the net change curve how much the momentum has speeded up in the beginning of the cost rises and how much more slowly it tapers off since 1945 than in similar but smaller movements before the war. Then momentum built up more slowly and dropped off fast.

The cost rise from 1946 to the 4th quarter of 1948 contained enormous momentum but the net change curve indicated that the intensity of this momentum was beginning to abate about midway in the advance. The downtrend of the net change curve during 1948 and 1949 was followed by the 17 months' stability produced by the basic index during this period.

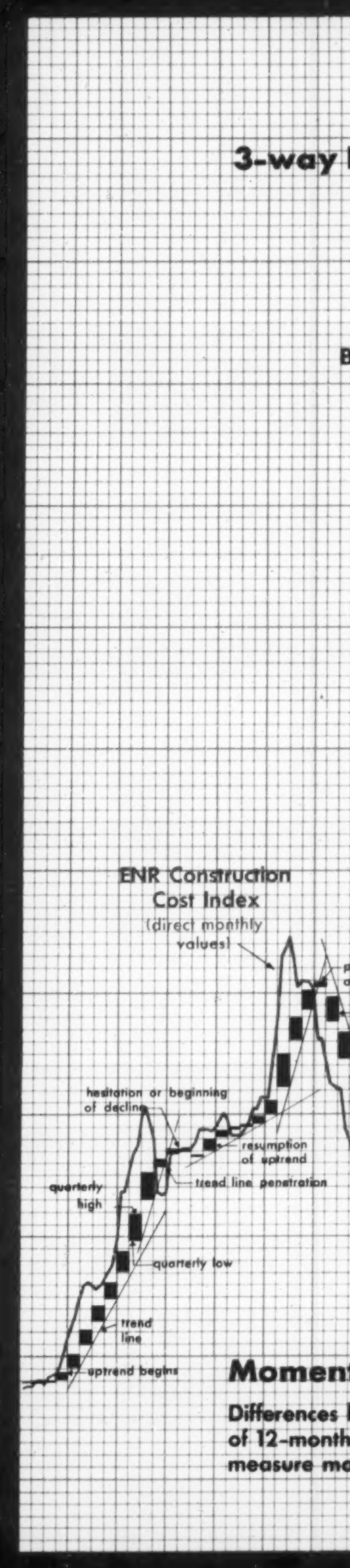
That the rise in costs was to continue became evident in the 1st and 2nd quarters of 1950. In the 1st quarter of 1951 the net change curve accurately heralded the 15 months' stability which followed.

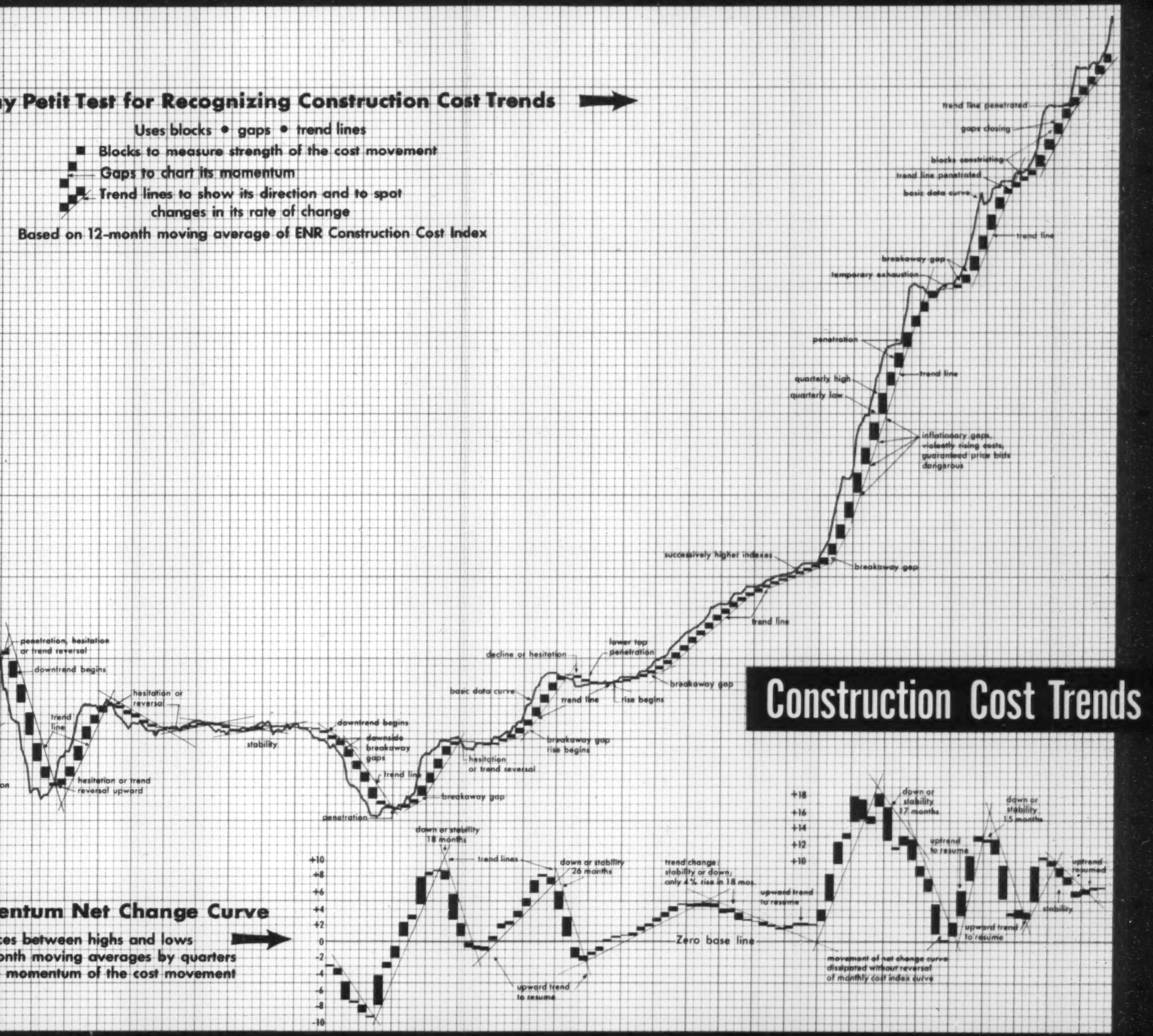
The net change curve obviously declined during this stability and dissipated itself without a basic index reversal. At the termination of the stability of the basic index in the 2nd quarters of 1952 the net change curve again foresaw the quickening of the basic index on the upside which ensued.

The net change curve, in the 2nd quarter of 1953, gave some indication that the long rise in wage scales and material prices may have been in the process of ending. But the *basic index remained above* the moving average curve and the net change curve still confined itself in a winding movement *above* its zero base line.

Hope for a general cost reversal was postponed by the significance of the upward penetration of the downtrend line of the net change curve in the 2nd quarter of 1954.

Now note this important development in the net change curve since 1945. This curve is gradually decreasing in intensity. It must be likened to a "damped" curve in mathematics and the physical sciences. It is gradually coming to a point or dead center in its movement. This has been caused by more frequent periods of stability in the basic index than have heretofor maintained. But a formation of this kind contains explosive probabilities. This is a situation which can erupt into a violent price movement – either up or down – but not before the action of the net change curve gives the clue, or flags the warning.




y Petit Test for Recognizing Construction Cost Trends
Uses blocks • gaps • trend lines
Blocks to measure strength of the cost movement
Gaps to chart its momentum
Trend lines to show its direction and to spot changes in its rate of change
Based on 12-month moving average of ENR Construction Cost Index
penetration, hesitation or trend reversal
downtrend begins
trend line
hesitation or reversal
hesitation or trend reversal upward
on
stability
downtrend begins
downside breakaway gaps
trend line
penetration
breakaway gap
hesitation or trend reversal
basic data curve
decline or hesitation
lower top penetration
trend line
rise begins
breakaway gap rise begins
breakaway gap
trend line
successively higher indexes
breakaway gap
quarterly high
quarterly low
penetration
trend line
inflationary gaps, violently rising costs, guaranteed price bids dangerous
temporary exhaustion
breakaway gap
trend line
basic data curve
trend line penetrated
blocks constricting
gaps closing
trend line penetrated
Construction Cost Trends
entum Net Change Curve
ces between highs and lows
onth moving averages by quarters
momentum of the cost movement
+10
+8
+6
+4
+2
0
-2
-4
-6
-8
-10
down or stability 18 months
trend lines
down or stability 26 months
upward trend to resume
trend change: stability or down; only 4% rise in 18 mos.
Zero base line
upward trend to resume
+18
+16
+14
+12
+10
movement of net change curve dissipated without reversal of monthly cost index curve
down or stability 17 months
uptrend to resume
upward trend to resume
down or stability 15 months
stability
uptrend resumed

Engineering News-Record Cost Indexes—1913 = 100

20—Cities, U S average. See insert charts for components and weighting, also for full record since 1913

CONSTRUCTION

	1926	1932	1939	1940	1942	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
Jan....	207.2	162.5	234.7	238.3	267.6	302.5	316.3	387.0	441.7	477.4	484.7	532.5	548.4	587.9	613.9
Feb...	206.6	161.8	234.3	238.3	269.4	303.7	319.5	393.7	442.7	475.4	484.9	538.6	549.9	587.8	614.5
Mar...	207.7	157.2	234.4	238.3	269.7	304.5	323.8	395.5	443.6	474.8	488.4	539.8	551.2	588.0	613.8
Apr....	207.1	153.1	234.9	238.3	271.8	306.4	334.6	399.6	443.6	474.3	491.9	540.6	554.7	590.1	615.2
May...	207.3	152.8	234.7	238.9	272.3	307.4	339.7	400.0	444.9	472.1	496.6	543.5	557.7	589.6	618.5
June...	204.8	152.2	235.0	241.6	274.2	309.0	348.7	406.6	455.8	473.8	506.9	543.4	562.3	593.1	621.5
July...	207.8	153.4	234.9	242.2	277.7	309.0	354.7	413.8	464.8	477.5	512.7	542.9	571.3	604.6	627.9
Aug...	208.3	156.8	234.9	242.2	281.6	309.1	361.4	422.9	477.1	478.3	521.4	543.5	584.3	612.6	642.1
Sept...	208.3	158.0	235.0	244.1	281.6	309.3	360.2	426.4	478.4	479.8	531.0	543.6	586.7	610.9	640.7
Oct....	209.8	159.2	236.9	245.0	282.4	309.3	360.9	434.6	480.2	480.5	536.2	547.1	589.0	611.6	.....
Nov...	210.8	158.2	238.2	247.2	283.6	309.3	362.5	436.9	478.3	480.0	530.0	547.7	589.2	611.8	.....
Dec...	210.8	158.5	238.2	249.1	283.7	313.5	369.3	441.1	477.7	480.3	530.8	548.3	588.1	611.3	.....
Ave....	**208.0**	**157.0**	**235.5**	**242.0**	**276.3**	**307.8**	**346.0**	**413.2**	**460.7**	**477.0**	**509.6**	**542.7**	**569.4**	**600.0**	.....

BUILDING

	1926	1932	1939	1940	1942	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954
Jan....	182.3	150.6	196.2	201.5	217.1	236.5	242.2	294.6	333.6	355.0	356.2	393.0	405.8	425.0	436.4
Feb...	183.7	147.2	196.2	201.5	218.4	237.7	243.9	301.6	335.5	352.9	356.5	398.2	406.2	425.2	437.1
Mar...	184.3	145.9	196.5	201.5	218.9	237.9	245.4	303.3	334.2	352.5	360.0	399.3	407.4	424.9	436.7
Apr....	184.1	135.7	196.5	201.4	219.6	238.5	254.4	305.2	334.6	351.4	362.8	400.1	407.9	426.4	437.5
May...	183.6	136.4	196.6	201.2	220.1	238.5	258.1	304.6	333.9	348.9	364.3	401.1	410.3	426.2	438.2
June...	181.8	137.6	196.4	201.7	221.2	239.4	265.3	307.4	339.3	349.3	373.4	400.8	412.5	426.2	439.7
July...	184.3	139.5	196.8	201.7	223.5	239.6	267.3	308.9	342.4	349.5	377.7	400.3	414.5	435.2	444.1
Aug...	185.1	138.4	196.5	201.7	225.4	239.9	272.3	317.8	355.5	350.9	383.1	400.2	422.4	436.9	455.5
Sept...	185.1	139.6	196.6	203.1	225.5	240.1	272.4	322.6	356.7	352.0	392.2	400.3	424.4	436.0	454.3
Oct....	188.0	140.0	198.5	204.2	225.9	240.4	273.0	327.3	357.1	353.0	397.4	403.4	424.8	436.0	.....
Nov...	188.0	139.5	201.2	206.2	226.6	240.6	274.0	329.2	355.9	352.9	390.2	404.5	426.0	436.0	.....
Dec...	188.0	140.0	201.2	208.2	226.6	240.8	280.0	333.1	355.6	353.2	391.4	405.8	424.9	435.5	.....
Av....	**184.9**	**140.9**	**197.4**	**202.8**	**222.4**	**239.1**	**262.4**	**313.0**	**344.5**	**351.8**	**375.5**	**400.6**	**415.6**	**430.8**	.....

These indexes measure trends in cost to construction men for labor and materials. They do not adjust for productivity of management or labor, for materials substitutions, for overtime, for mechanization, for competitive conditions. Elsewhere in these pages they are compared with contractor indexes and bid price indexes that do reflect these "intangibles." For conversion to other base years, see following pages. For graphs see folded inserts.

For other base years

Engineering News-Record Cost indexes are the aggregative type, based on a hypothetical block of construction. Thus they may be converted to any base year desired:

Index Value	Construction Cost Base Years				Building Cost Base Years			
	'26 =	'39 =	'40 =	'49 =	'26 =	'39 =	'40 =	'49 =
Year	100	100	100	100	100	100	100	100
1926....	100	88	86	44	100	94	91	53
1928....	99	...	...	...	102	...	...	...
1929....	100	...	...	...	103	...	...	...
1930....	98	...	...	...	100	...	...	...
1931....	87	...	...	...	91	...	...	...
1932....	75	...	...	...	76	...	...	...
1933....	82	...	...	...	80	...	...	...
1939....	113	100	...	...	107	100	...	...
1940....	116	103	100	...	110	103	100	...
1941....	124	109	107	...	114	107	104	...
1942....	133	117	114	...	120	113	110	...
1945....	148	131	127	...	129	121	118	...
1946....	166	147	143	...	142	133	129	...
1947....	199	175	171	...	169	159	154	...
1948....	222	196	190	...	186	175	170	...
1949....	229	203	197	100	190	178	173	100
1950....	245	216	211	107	202	190	185	107
1951....	261	230	224	114	217	203	198	114
1952....	274	242	235	119	225	211	205	118
1953....	288	255	248	126	233	218	212	122
	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)

For conversion factors (a, b, c, d), see table on following page.

Conversions to other base years are made by simple ratios:

$$I_{nb} = \frac{I_{ob}}{I_{nby}} \times 100$$

where

I_{nb} is index value on new base
I_{ob} is index value on old base
I_{nby} is old base index value for new base year

ENR Cost Indexes in 21 cities, 1913 = 100

CONSTRUCTION

21 Cities	1948 Sep	Dec	1949 Mar	Jun	Sep	Dec	1950 Mar	Jun	Sep	Dec	1951 Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1952 Jan	Feb	Mar	Apr	May	Jun
Atlanta	325	345	345	345	345	345	354	354	394	390	395	397	397	395	395	395	395	395	395	395	395	395	395	395	395	397
Baltimore	462	462	462	425	424	424	427	462	479	474	486	483	492	488	483	479	482	487	492	513	510	510	510	508	509	511
Birmingham	378	379	379	389	389	377	381	381	388	413	416	416	416	416	416	416	416	416	416	416	416	416	417	417	417	417
Boston	513	508	507	526	525	532	536	556	570	563	576	576	590	586	586	586	590	588	588	588	585	588	590	587	611	614
Chicago	537	530	527	526	541	542	550	584	607	593	603	603	603	598	617	620	620	624	624	624	624	626	626	626	626	626
Cincinnati	505	505	490	487	496	496	502	510	568	553	559	559	559	556	543	543	543	548	548	548	547	547	547	549	549	553
Cleveland	535	523	520	514	525	530	537	578	605	587	607	612	607	606	596	598	603	627	628	626	624	625	625	668	685	685
Dallas	398	398	398	398	394	397	422	423	423	438	437	437	437	437	437	437	437	437	437	437	437	437	437	437	437	437
Denver	499	496	482	482	470	470	491	506	541	528	552	552	558	558	558	573	564	564	564	564	564	571	571	571	571	572
Detroit	511	500	501	489	514	515	521	555	583	592	592	603	602	602	601	600	601	601	601	601	601	621	621	621	622	625
Kansas City	500	500	484	501	511	511	528	551	571	570	570	570	575	575	586	586	586	586	586	586	586	586	586	586	588	588
Los Angeles	511	495	482	478	489	494	511	529	552	537	580	574	574	572	567	558	558	565	569	569	568	563	565	565	567	574
Minneapolis	512	510	504	504	512	512	516	538	555	562	557	557	587	587	587	587	587	592	592	592	593	593	593	593	593	593
New Orleans	350	354	379	379	379	379	383	402	408	438	441	440	439	439	440	440	434	434	434	435	435	435	435	435	435	437
New York	549	541	537	534	533	539	546	575	632	622	630	630	630	627	624	620	621	626	626	626	623	623	623	623	629	629
Philadelphia	470	467	462	492	517	515	518	541	556	575	575	575	575	575	582	582	582	582	582	582	582	582	601	601	601	616
Pittsburgh	470	502	502	492	492	492	497	499	532	529	531	531	531	531	531	551	551	557	557	557	557	557	557	557	557	577
St. Louis	542	542	527	508	524	522	529	552	579	569	585	585	585	597	587	582	584	584	582	587	584	587	587	605	605	608
San Francisco	490	484	478	478	483	483	486	495	513	519	518	523	533	533	528	524	525	533	533	527	534	529	532	532	535	565
Seattle	512	512	530	530	530	530	534	548	564	563	586	586	586	586	593	593	593	593	598	592	606	606	606	620	620	620
Montreal	406	408	407	408	396	394	397	397	428	427	445	456	457	478	478	484	484	484	484	484	502	500	500	500	500	51

BUILDING

21 Cities	1948 Sep	Dec	1949 Mar	Jun	Sep	Dec	1950 Mar	Jun	Sep	Dec	1951 Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1952 Jan	Feb	Mar	Apr	May	Jun
Atlanta	202	308	308	308	309	313	316	316	339	339	339	341	341	339	339	338	339	339	347	351	351	351	351	351	351	353
Baltimore	375	387	387	349	354	351	354	375	391	387	398	396	402	403	399	395	398	403	408	413	410	410	410	407	409	414
Birmingham	320	321	326	329	330	319	321	321	328	345	351	351	351	351	351	351	351	353	353	353	353	353	355	355	355	358
Boston	363	357	357	362	361	372	375	379	396	392	404	404	411	407	408	408	412	410	410	410	407	410	411	409	419	422
Chicago	360	353	350	349	352	353	361	381	404	391	401	401	401	395	400	403	403	404	403	413	413	415	415	415	415	416
Cincinnati	374	374	358	356	362	362	360	368	406	392	400	400	401	398	391	395	395	400	400	401	400	400	400	402	402	406
Cleveland	352	339	337	332	342	349	356	379	406	388	402	408	402	402	391	393	399	405	405	403	401	403	403	410	419	419
Dallas	322	322	322	322	316	318	322	323	323	338	362	362	362	362	362	371	371	371	371	371	371	371	371	371	371	371
Denver	369	365	351	351	359	359	378	395	423	400	426	426	432	432	432	432	423	423	423	425	425	431	431	431	431	433
Detroit	358	347	348	336	351	351	357	376	404	400	402	413	411	411	410	409	410	410	413	416	419	419	419	419	422	424
Kansas City	366	367	352	357	357	357	374	390	410	406	406	406	411	411	417	417	417	417	417	417	417	417	431	431	434	434
Los Angeles	368	356	343	339	336	340	360	380	392	377	403	398	398	395	390	381	381	394	398	398	397	392	394	399	401	407
Minneapolis	370	368	361	361	361	363	377	389	406	413	408	408	408	421	423	423	423	438	438	438	438	438	438	438	438	438
New Orleans	302	310	325	325	325	325	329	340	346	376	379	378	377	377	384	384	379	379	379	379	379	379	379	379	379	381
New York	403	395	400	398	397	402	410	439	464	459	466	466	466	463	460	457	457	462	462	462	460	460	460	460	465	465
Philadelphia	394	391	386	394	394	392	397	415	430	449	449	449	449	449	456	456	456	456	458	461	461	461	462	462	462	472
Pittsburgh	376	384	384	375	375	377	382	387	401	397	400	400	400	400	400	405	405	411	411	416	416	416	416	416	416	416
St. Louis	385	391	386	375	379	377	384	396	431	421	432	432	437	436	426	421	422	422	422	427	424	427	429	431	441	444
San Francisco	350	347	341	341	341	345	352	361	383	389	375	380	380	380	380	375	377	385	385	379	385	381	383	383	386	386
Seattle	328	328	328	328	340	341	344	358	374	374	384	384	384	384	389	389	389	389	389	383	389	389	389	389	389	389
Montreal	314	316	315	316	316	314	317	317	346	345	363	373	374	383	383	385	385	385	385	385	385	383	383	383	383	393

Components of Construction Cost and Building Cost Indexes and weighting in U. S. cities are same as for U. S. average Index. In Montreal, warehouse price of steel has to be used, so 15 cwt is weighting for steel. Price of Canadian steel is used prior to Oct. 1949—and the average of Canadian and American steel prices is used after the devaluation of Canadian dollar in Oct. 1949. Cement weighting is 10 bbl. Other elements are same as for U. S. cities.

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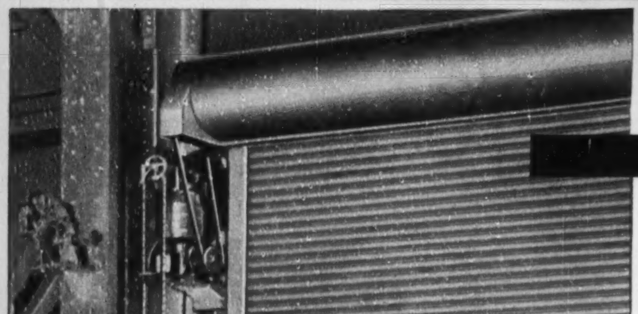
Preferred the world over for a *half century!*



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Index conversion table to other base years

To change base years for Engineering News-Record Construction and Building Cost Indexes, divide by following conversion factors;

To convert From base 1913=100 to base below	Divide 1913 = 100 values for Construction Cost Index by	Building Cost Index by
1949=100 .... (d)	4.7702	3.5179
1947-49	4.5033	3.3642
1940=100 .... (c)	2.4196	2.0281
1939=100 .... (b)	2.3551	1.9744
1926=100 .... (a)	2.0803	1.8499
1925-29=100	2.0695	1.8648
1926-29=100	2.0702	1.8747
1929=100	2.0702	1.9086
1910-14=100	0.9380	0.9477
1924=100	2.1536	1.8578
1923-25=100	2.1204	1.8481
1914=100	0.8856	0.9191
1911=100	0.9343	0.9414

Applies to 20-cities index, not to individual cities.

(a, b, c, d) conversion factors used to get the accompanying table showing ENR cost index values for four different base years.

Construction dollar volume compared with volume index

Year	Engineering construction volume millions $	1913 $ volume equals 100	ENR volume index * 1913 = 100
1925	$2,559	426	218
1926	2,854	475	246
1927	3,254	541	279
1928	3,579	595	305
1929	3,950	657	334
1930	3,173	528	273
1931	2,432	404	226
1932	1,219	203	134
1933	1,068	178	110
1934	1,361	226	120
1935	1,590	264	143
1936	2,387	397	204
1937	2,438	405	190
1938	2,792	464	213
1939	3,003	499	228
1940	3,987	664	299
1941	5,869	976	430
1942	8,006	1,331	546
1943	3,062	509	204
1944	1,730	288	110
1945	2,289	381	146
1946	5,176	844	298
1947	5,659	941	271
1948	7,219	1,200	304
1949	8,157	1,358	345
1950	13,342	2,220	549
1951	13,605	2,264	522
1952	15,689	2,610	577
1953	15,171	2,524	506
1954#	9,349#	1,556#	482#

*** corrected for cost changes by dividing dollar volume by ENR construction and building cost indexes and reducing to 1913 = 100   # 8 months**

History and use of ENR cost indexes

The construction cost index was established in 1921, based on structural steel, portland cement, lumber and common labor. The building cost index was added in 1938 to measure the effect of skilled wage trends on costs. Both use the same materials component.

Such minor changes as have been made are recorded in full in ENR, September 1, 1949, page 398.

Both indexes assume a hypothetical block of construction requiring 6 bbl of cement, 1.088 Mftbm of "2x4" lumber and 25 cwt of structural steel. The construction cost index uses 200 hr of common labor. The building cost index uses 68.38 hr of skilled labor. Both are reported monthly on a 20-cities average basis, both are available quarterly, since September, 1948, for each of the cities for which ENR reports prices and wages.

ENR Cost Indexes in 21 cities, 1913 = 100

CONSTRUCTION

	1952					
21 Cities	Jul	Aug	Sep	Oct	Nov	Dec
Atlanta	397	402	402	418	418	418
Baltimore	525	531	530	530	533	526
Birmingham	445	450	450	450	450	450
Boston	625	630	630	633	633	629
Chicago	656	661	661	661	661	661
Cincinnati	551	612	612	612	611	609
Cleveland	685	686	684	683	683	682
Dallas	437	455	455	455	455	455
Denver	572	577	577	612	612	612
Detroit	641	646	656	666	666	663
Kansas City	618	623	623	623	623	623
Los Angeles	567	610	610	610	610	610
Minneapolis	593	598	628	628	628	628
New Orleans	461	466	466	466	466	466
New York	629	665	667	666	665	665
Philadelphia	631	636	636	636	636	636
Pittsburgh	600	607	607	607	607	607
St. Louis	599	626	629	626	631	628
San Francisco	562	570	573	562	560	559
Seattle	627	632	635	635	635	635
Montreal	510	512	512	512	512	512

	1953											
21 Cities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atlanta	418	424	424	438	438	438	444	460	460	460	460	460
Baltimore	528	528	524	528	525	525	531	554	551	553	553	553
Birmingham	450	450	450	449	447	447	454	469	469	469	469	465
Boston	626	626	626	627	625	623	630	630	626	626	624	624
Chicago	661	661	661	662	662	690	697	692	691	690	690	690
Cincinnati	609	609	609	613	613	613	639	637	633	633	633	631
Cleveland	680	682	682	682	683	706	712	711	709	709	708	708
Dallas	455	455	455	456	456	463	470	470	470	475	482	482
Denver	612	602	602	603	603	582	589	604	604	600	600	595
Detroit	665	665	663	663	663	663	689	687	687	682	682	682
Kansas City	623	623	623	623	623	623	629	643	630	630	630	630
Los Angeles	610	610	610	612	612	612	635	633	627	626	626	626
Minneapolis	628	628	628	629	629	655	661	661	661	661	661	661
New Orleans	461	461	476	486	486	486	506	506	506	506	502	502
New York	665	665	665	666	666	664	670	706	713	713	713	713
Philadelphia	636	636	636	637	635	635	641	666	666	666	666	666
Pittsburgh	607	607	607	608	608	608	640	640	640	640	640	640
St. Louis	627	627	627	626	626	648	654	654	653	650	655	654
San Francisco	560	561	557	561	558	556	561	588	587	601	597	600
Seattle	635	635	635	636	636	636	642	642	636	643	643	643
Montreal	515	516	516	516	516	516	516	540	550	550	550	550

	1954									
21 Cities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	9/16
Atlanta	460	460	458	458	458	458	458	464	474	474
Baltimore	553	552	549	549	551	548	548	572	573	573
Birmingham	465	465	465	465	465	465	466	486	488	488
Boston	626	626	627	628	659	659	663	671	669	669
Chicago	691	691	692	692	692	693	726	738	734	733
Cincinnati	630	630	630	630	630	630	650	644	641	641
Cleveland	709	709	712	711	711	731	740	738	738	737
Dallas	482	482	470	470	465	465	465	487	487	487
Denver	595	595	595	595	597	597	609	638	633	633
Detroit	685	685	685	689	690	700	721	732	729	729
Kansas City	631	633	635	645	645	645	653	662	661	661
Los Angeles	629	634	634	640	640	640	641	684	665	662
Minneapolis	661	661	661	661	661	681	682	697	697	697
New Orleans	506	506	506	506	506	516	520	528	528	517
New York	734	733	732	732	732	732	734	742	742	742
Philadelphia	666	666	666	666	681	681	681	689	691	691
Pittsburgh	640	642	642	642	642	642	642	666	666	666
St. Louis	654	654	655	656	671	669	673	690	684	684
San Francisco	601	605	602	605	616	617	624	632	631	631
Seattle	664	664	664	665	665	665	665	677	682	679
Montreal	550	550	516	516	513	513	513	528	526	526

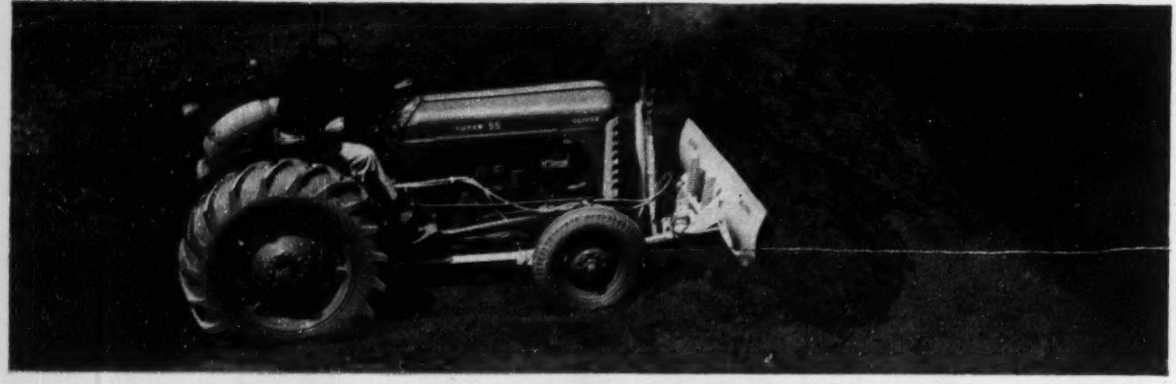
BUILDING

	1952					
21 Cities	Jul	Aug	Sep	Oct	Nov	Dec
Atlanta	356	364	364	368	371	371
Baltimore	415	421	420	420	423	416
Birmingham	361	366	372	372	372	372
Boston	421	426	426	429	429	425
Chicago	421	428	432	433	433	433
Cincinnati	408	423	423	423	422	420
Cleveland	423	432	431	429	429	428
Dallas	371	382	382	382	382	382
Denver	436	441	452	462	462	462
Detroit	430	435	439	442	442	438
Kansas City	441	446	446	446	446	446
Los Angeles	401	415	415	415	415	415
Minneapolis	438	443	450	450	454	454
New Orleans	391	396	397	397	397	397
New York	465	484	487	485	484	484
Philadelphia	472	477	477	477	480	480
Pittsburgh	419	427	427	427	439	439
St. Louis	442	445	448	445	450	447
San Francisco	388	398	401	393	391	390
Seattle	392	397	400	400	400	400
Montreal	393	396	395	395	395	395

	1953											
21 Cities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Atlanta	371	376	376	376	376	376	383	394	394	394	394	394
Baltimore	418	418	414	418	415	415	425	429	427	428	428	428
Birmingham	372	372	372	370	372	372	382	382	390	390	390	386
Boston	422	422	422	422	421	419	428	434	433	435	433	433
Chicago	433	433	433	434	434	443	449	444	443	443	443	443
Cincinnati	420	420	420	424	424	424	435	433	435	436	436	434
Cleveland	426	428	430	430	431	435	442	441	439	439	438	438
Dallas	382	382	382	383	387	387	394	397	397	397	405	405
Denver	462	452	452	453	453	434	440	449	449	446	446	441
Detroit	441	441	438	438	438	441	452	450	450	446	446	446
Kansas City	446	446	446	446	446	452	458	455	442	442	442	442
Los Angeles	416	418	420	421	421	421	426	426	420	419	419	419
Minneapolis	454	454	454	455	455	459	467	468	468	468	468	468
New Orleans	397	397	398	407	407	407	419	419	419	419	416	416
New York	484	484	484	485	485	483	494	498	505	507	507	507
Philadelphia	480	480	480	481	479	479	490	492	494	494	494	494
Pittsburgh	439	439	439	440	440	440	460	460	460	460	460	460
St. Louis	446	446	446	446	446	446	452	458	457	454	455	455
San Francisco	391	395	391	395	392	390	398	398	397	401	398	400
Seattle	400	400	400	401	401	401	408	408	402	402	402	402
Montreal	398	399	399	399	399	399	399	423	430	430	430	430

	1954									
21 Cities	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	9/16
Atlanta	394	394	392	392	392	392	392	398	400	400
Baltimore	428	428	424	424	426	423	423	447	448	448
Birmingham	386	386	386	386	386	386	387	406	409	409
Boston	435	435	436	437	438	438	442	450	448	451
Chicago	444	444	445	445	445	449	458	470	467	466
Cincinnati	433	433	435	435	434	434	437	444	444	444
Cleveland	439	439	442	441	441	451	460	458	458	457
Dallas	405	405	393	393	387	390	390	402	405	405
Denver	441	441	441	441	443	443	455	470	468	468
Detroit	448	448	449	453	454	452	458	470	467	467
Kansas City	442	445	446	446	450	450	458	468	466	466
Los Angeles	422	428	428	433	433	433	434	457	448	446
Minneapolis	468	468	468	468	468	473	476	491	491	491
New Orleans	419	419	419	419	419	422	427	435	435	424
New York	512	511	509	509	509	516	518	526	526	526
Philadelphia	494	494	494	494	503	503	503	511	516	516
Pittsburgh	460	463	463	463	463	463	463	475	475	475
St. Louis	455	455	455	456	458	457	460	480	473	473
San Francisco	401	405	402	406	406	407	417	425	423	425
Seattle	405	405	412	413	413	413	413	425	419	417
Montreal	430	430	396	396	393	393	393	393	391	391

These ENR Cost Indexes measure movements in the cost to contractors and engineers of construction materials and labor. They do not adjust for productivity. Where major differences between cities occur, the main réason is found usually in wage differentials. Lower wages are often accompanied by lower productivity, hence allowances for job productivity should be made in estimating end-produce-price, or construction-selling-price trends based on the cost trends shown here.



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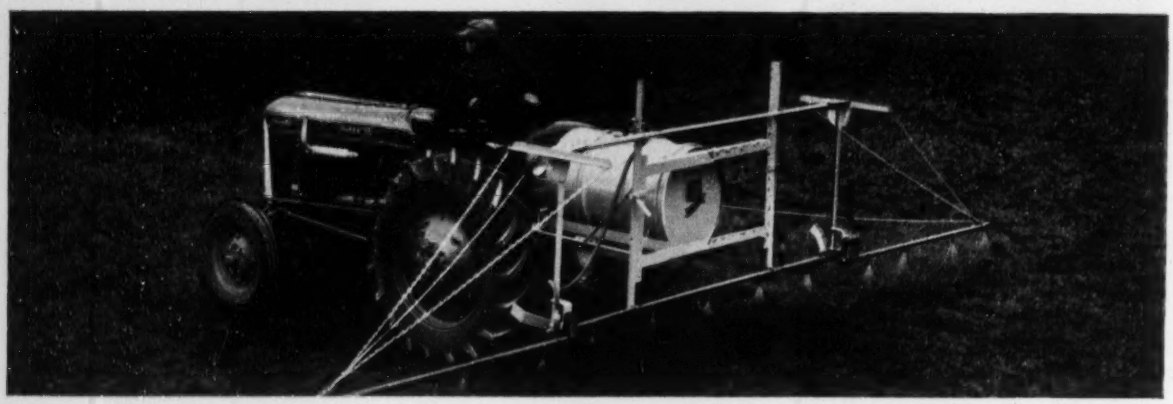

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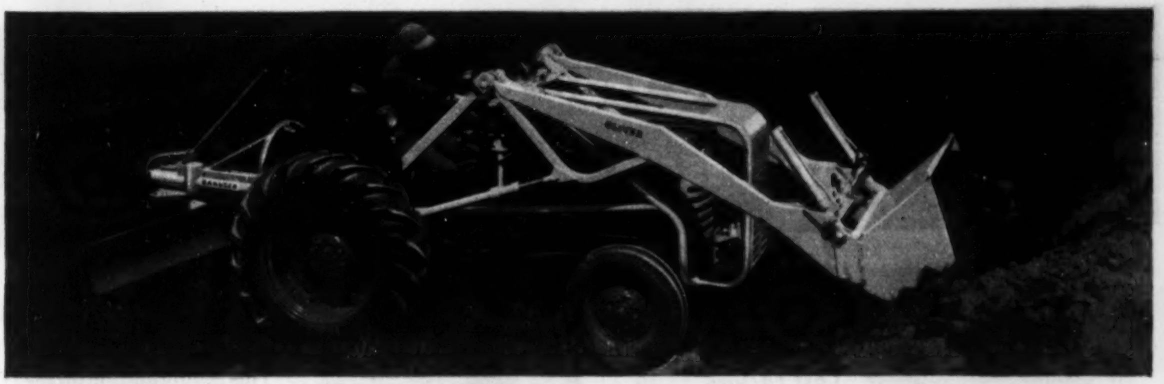

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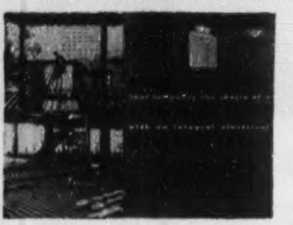

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6.
Acoustical Data on Q-Deck

Though the fluted undersurface of Q-Deck provides some acoustical value, demand for more has led Robertson engineers to devise a new low-cost treatment. Test data and details are included.

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Building cost and price index roundup

Yearly averages, 1913 = 100

WEIGHTED	Orig. Base	1926	1932	1939	1942	1945	1946	1948	1949	1950	1951	1952	1953	1954
ENR Construction	1913=100	208	157	236	276	308	346	461	477	509	542	569	600	641 Sept.
ENR Building	1913=100	185	141	197	222	239	262	345	352	375	401	416	431	454 Sept.
American Appraisal*	1913=100	217	155	200	241	271	322	490	490	500	532	553	577	591 July
Assoc. Gen. Contr	1913=100	197	171	188	209	231	257	332	342	357	377	388	408	429 July
Boeckh, U. S. aver	1926–29=100	181	144	191	214	252	275	365	369	386	415	430	445	452 July
Marshall & Stevens	1926=100	185	130	183	218	248	288	368	365	390	430	436	448	455 June
Smith, Hinchman & Grylls*	1926=100	185	128	199	226	285	319	405	395	426	476	499	504	501 Aug.
ICCRR Sta & Off Bldgs	1910–14=100†	184	141	166	208	244	291	364	368	390	412	426	438	....
WR & A—RC Bldg Pac Div	1911–14=100†	191	153	192	240	248	273	393	416	426	460	467	489	518 July

* Correct for productivity.

CONTRACTOR	Orig. Base	1926	1932	1939	1942	1945	1946	1948	1949	1950	1951	1952	1953	1954
Aberthaw	1914=100†	197	168	190	223	236	279	321	312	321	370	381	388	393 June
Austin	1926=100	185	117	152	213	234	273	317	307	313	337	342	347	352 June
Fruin-Colnon	1926=100	218	178	208	227	247	285	382	382	398	433	449	460	469 June
Fuller	1913=100	202	157	195	229	241	290	380	382	377	405	416	429	452 July
Turner	1939=100	195	136	182	245	263	318	422	414	427	478	490	500	487 July

† Not converted to 1913=100.

Most of these indexes are special purpose indexes, some measure trends in cost of labor and materials, others the price movements of completed construction. Definitions and graphs will be found on the folded color insert.

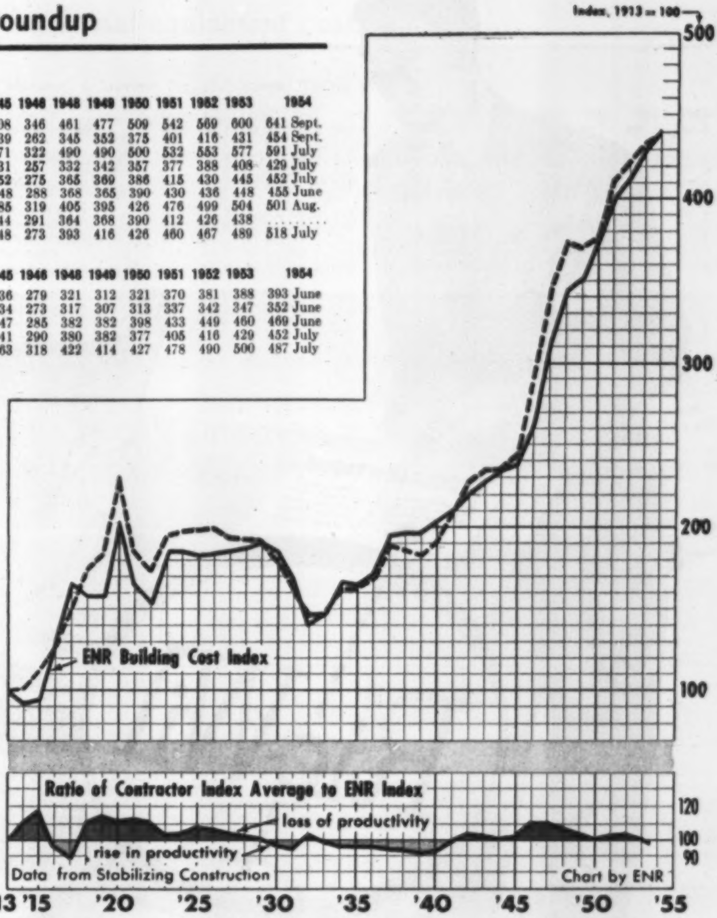
Building cost index

American Appraisal Co., Milwaukee

30-cities average and 22 individual cities, 1913 = 100

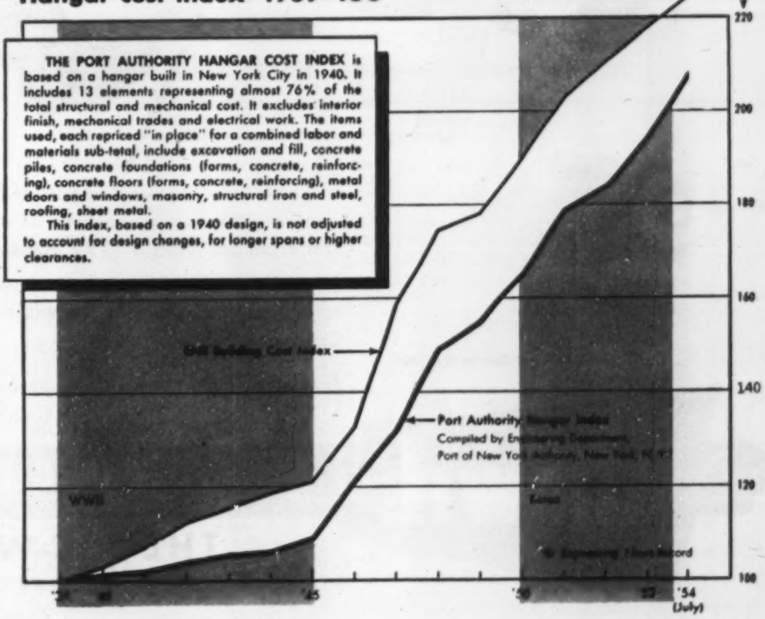
	'26	'32	'39	'42	'45	'49	'51	'53	'54
U. S. Av., 30 cities	217	155	200	241	271	490	532	577	591
Boston	224	169	210	248	270	485	532	581	596
New York	234	170	219	248	272	503	545	594	624
Buffalo	219	157	205	247	279	506	551	605	624
Baltimore	224	166	198	248	277	510	545	585	595
Philadelphia	225	161	196	247	275	481	524	572	589
Pittsburgh	236	172	219	249	279	486	524	571	581
Cincinnati	217	157	209	242	272	477	508	556	575
Cleveland	233	160	206	245	268	485	537	577	595
Chicago	219	162	205	235	260	452	503	539	555
Indianapolis	219	157	206	247	276	501	535	584	606
Detroit	224	148	208	252	278	500	549	602	626
Milwaukee	218	144	209	254	280	493	558	609	617
Minneapolis	197	148	202	235	266	453	493	546	556
Kansas City	220	156	209	239	268	469	504	538	554
St. Louis	230	163	208	238	265	478	523	569	595
Atlanta	211	147	186	240	278	514	558	627	640
Dallas	204	146	171	209	246	455	483	527	529
New Orleans	217	145	194	234	277	501	533	589	600
Denver	204	149	195	226	245	441	480	518	520
Seattle	199	141	196	244	277	509	553	574	581
San Francisco	188	144	183	225	244	446	491	524	530
Los Angeles	195	141	167	213	249	475	517	549	552

- **American Appraisal Company**, Milwaukee, Wis.—This index is based on detailed analysis of materials and labor required for four types of buildings (frame, brick, concrete and steel) in 30 representative cities. It is repriced monthly in accordance with: 1. prevailing wage scales and labor performance for the various building trades, and 2. quotations for construction materials in 30 key cities in the United States. The index corrects for labor productivity but assumes normal average conditions and does not give any recognition to overtime or bonus payments to labor or premiums paid for materials in individual cases or under temporary abnormal conditions. It applies to construction only, does not include plumbing, heating, lighting, sprinklers, fixtures and decorations.



When building price indexes rise faster than cost indexes, productivity is low. In 1954 costs are rising faster than prices, productivity is high.

Hangar cost index—1939=100



THE PORT AUTHORITY HANGAR COST INDEX is based on a hangar built in New York City in 1940. It includes 13 elements representing almost 76% of the total structural and mechanical cost. It excludes interior finish, mechanical trades and electrical work. The items used, each repriced "in place" for a combined labor and materials sub-total, include excavation and fill, concrete piles, concrete foundations (forms, concrete, reinforcing), concrete floors (forms, concrete, reinforcing), metal doors and windows, masonry, structural iron and steel, roofing, sheet metal.

This index, based on a 1940 design, is not adjusted to account for design changes, for longer spans or higher clearances.

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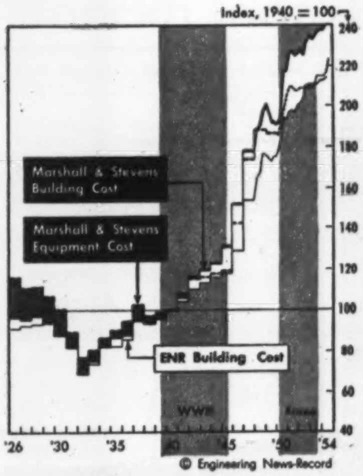

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• **Marshall & Stevens** indexes cover both comparative building costs, 1902 to date, and comparative equipment costs, 1913 to date.

The building indexes are national averages with a system of modifiers to get regional and municipal values for each of four types of building. A. Fireproof, protected steel, B. Fireproof, reinforced concrete, C. Masonry buildings, D. Frame. They are designed to reflect normal costs in line with recognized or published prices of building materials, equipment and labor. Extraordinary or intangible conditions are not included. Composite building cost series is converted to 1913 = 100 for table on page 101 and for the color insert.

Comparative equipment costs, developed to cover the composite of the entire plant, machinery of various kinds, mechanical installation, furniture and fixtures, hand tools and other are combined in proper proportion to their average occurrence in each plant and computed for 47 industries. Eleven series are reproduced here, five of which are averages of 3 or more M&S related series. These are M&S estimates of actual cost paid for installed plant equipment, as a whole.

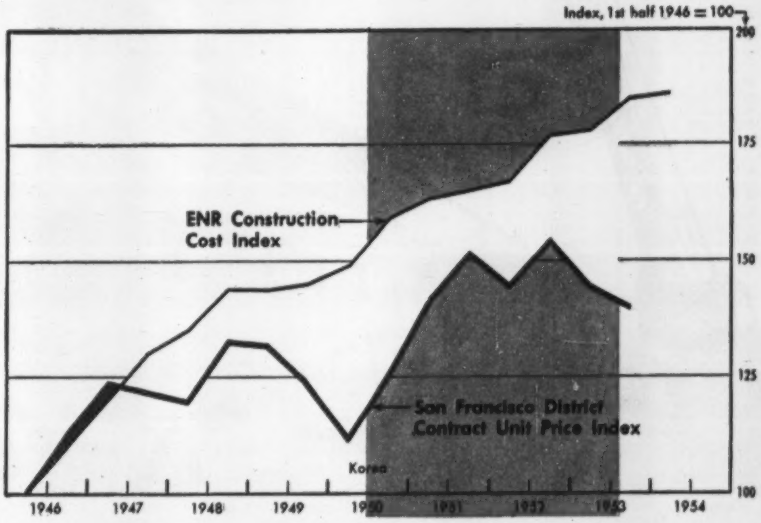
Industrial equipment cost indexes

Marshall & Stevens, Inc. of Chicago, Illinois, 1926 = 100

Industry	1929	1932	1939	1945	1946	1947	1948	1949	1950	1951	1952	1953	8/54
Average of All	**91.9**	**66.1**	**84.8**	**103.4**	**123.2**	**150.6**	**162.8**	**161.2**	**167.9**	**180.3**	**180.5**	**182.5**	**185.0**
Tommercial (av. 12*)	91.8	67.6	86.8	105.2	120.9	146.9	158.6	152.7	159.8	171.8	170.6	172.6	173.5
Cransportation—garage	91.5	69.2	83.6	100.9	123.9	157.0	171.1	170.3	179.7	194.6	195.1	197.0	199.5
Public util (av 2*)	91.8	70.1	82.9	97.5	119.5	145.8	159.6	159.7	164.8	176.1	176.6	178.8	182.2
Process (av 9*)	90.5	73.2	83.6	103.8	123.0	149.1	161.9	161.1	166.6	178.1	178.5	180.5	183.8
Food (av 10*)	92.6	68.5	84.9	104.1	126.1	156.8	169.7	169.2	177.1	189.7	190.2	192.4	195.3
Metal working	92.3	67.9	83.6	110.7	131.2	151.3	161.8	161.8	166.9	178.0	178.6	181.0	184.5
Aircraft	93.0	66.7	85.0	109.8	127.0	162.9	178.3	177.5	186.1	201.0	201.7	203.8	206.3
Mach & parts, elec eq.	92.0	68.0	83.4	106.8	130.3	156.6	167.4	167.7	175.0	188.6	189.2	191.4	195.1
Textile	91.1	67.8	83.7	101.8	122.1	146.6	157.4	157.3	165.9	192.1	193.3	198.0	199.9
Woodworking	92.0	67.2	83.6	100.9	123.0	149.6	160.4	160.4	165.5	176.6	177.1	172.3	173.4
General (av 7*)	95.5	68.8	84.6	103.2	122.0	149.7	162.0	161.8	168.2	180.4	180.8	182.6	185.4
Cold storage—refrig	92.0	70.0	82.1	101.7	125.7	163.2	176.6	175.8	185.2	200.1	200.7	202.8	205.3
Contractors' equipment	91.0	71.9	82.4	102.5	124.2	150.3	161.1	161.1	166.2	177.3	177.8	179.9	183.4

* In each of these groups, MARSHALL AND STEVENS reports separate comparative equipment cost trends for: COMMERCIAL: Apartment, bank, church, hotel, library, restaurant, school, store, theatre, hospital, dwelling, office GENERAL: Laundry, mining and milling, motion picture, printing, shipbuilding, warehouses, logging

PUBLIC UTILITY: Steam power, electric power
PROCESS: Distillery, cement, chemical, glass, petroleum industry, paint, paper, rubber, clay products
FOOD: Bakery, bottling, brewery, candy, cannery-fish, cannery-fruit, creamery, dairy (flour, cereal feed), packing-fruit, packing-meat



Bids prices in western states

The downtrend in bid prices continued through 1953 in the face of rising costs. Evidence of this trend in the western states comes from the index compiled by the Estimates Section, San Francisco District, Corps of Engineers, U. S. Army based on the average of three low bids on all significant projects for which unit prices were reported in "Daily Construction Service." The index, its components and their weights are shown here.

Contract unit price index—western states

Estimates Section, San Francisco District, Corps of Engineers, U. S. Army—1st half 1946 = 100

		1946	1949		1950		1951		1952		1953	
		1st half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2nd half	1st half	2rd half
Index. 1st Half 1946 = 100		100.0	132.2	124.3	111.9	126.08	141.94	151.57	144.78	155.04	145.35	140.50
Items used in index	Unit				Based on these average unit prices							
Cr rock base course	ton	2.81	2.29	2.41	2.37	2.20	2.55	3.05	2.60	3.18	2.80	3.03
Plant mix aggregate	ton	4.82	4.43	4.35	3.75	4.68	4.68	5.95	5.51	5.25	5.99	5.16
Plant mix asphalt	ton	22.00	26.85	22.20	18.98	23.00	20.35	20.44	24.34	24.60	24.00	26.00
Cover aggregate	ton	5.09	5.65	5.50	5.22	5.07	4.67	3.91	4.06	6.62	6.37	6.44
Structural concrete	cy	50.65	65.07	59.20	54.11	58.00	69.75	75.00	75.81	73.20	71.00	72.00
Pavement concrete	cy	13.20	19.69	24.83	18.50	20.00	24.46	26.79	18.97	28.88	19.00	19.00
Reinforcing steel	cwt	9.60	12.70	11.40	11.00	13.40	14.70	15.50	14.30	14.60	13.70	14.00
Cement	bbl	2.84	4.98	4.52	4.24	4.75	4.75	5.07	4.63	4.77	4.83	4.91
CM pipe 12"	lf	2.20	3.03	2.88	2.75	3.00	4.04	4.08	3.65	3.85	3.61	3.78
CM pipe 24"	lf	4.05	5.26	4.88	4.82	5.23	4.41	6.15	6.16	6.53	6.46	6.75
RC pipe 18"	lf	3.50	4.27	4.55	4.54	5.08	6.38	5.93	5.50	5.83	6.25	5.51
RC pipe 36"	lf	8.29	10.47	10.70	9.48	10.26	15.76	13.66	14.33	13.27	13.94	12.66
VC pipe 6"	lf	1.87	2.39	2.29	2.00	2.44	2.91	3.40	2.94	3.32	3.01	2.87
VC pipe 8"	lf	2.22	2.80	2.81	2.82	2.60	3.86	4.17	3.77	3.93	3.53	3.46
Sewer manhole	1/10 ea	16.50	20.80	19.20	17.80	21.20	21.20	25.10	22.82	26.66	25.34	17.60
Roadway excavation	cy	0.67	.96	.90	.64	.78	.78	1.04	.92	1.22	1.07	1.15
Structural excavation	cy	2.49	4.27	3.26	3.14	3.76	4.08	3.90	3.42	3.70	3.57	4.26
Watering	M gal	2.13	2.13	1.75	1.66	1.84	2.17	2.06	1.97	2.22	2.14	2.07
Flat wheel roller	R-hr	5.47	7.82	6.86	7.79	6.92	8.19	6.76	7.26	8.68	8.00	9.36
Piling, gr wood, fur	lf	0.64	0.65	0.58	0.64	0.88	0.97	1.26	1.68	1.09	1.01	1.38
Piling, treated, fur	lf	1.25	1.45	1.45	1.20	1.53	1.98	2.03	2.08	1.93	1.77	1.74
Timber in place	100 fbm	16.60	26.33	25.34	21.20	27.70	32.20	32.00	30.90	30.50	30.80	28.00
2" Galv steel pipe	lf	1.04	1.38	1.18	1.24	1.33	1.43	1.46	1.51	1.61	1.68	1.45
Cast-iron pipe 6"	lf	2.86	4.17	3.93	3.50	3.86	4.47	4.95	4.42	5.57	4.15	4.53
Cast-iron pipe 8"	lf	3.80	6.47	5.01	5.35	5.66	4.67	6.98	6.29	6.64	5.66	5.68
Gate valve 6"	1/10 ea	7.06	9.70	8.80	8.00	9.00	9.47	12.80	10.55	12.60	11.80	9.30
Total in dollars		**193.65**	**256.01**	**240.78**	**216.74**	**244.17**	**274.88**	**293.53**	**280.34**	**300.25**	**281.48**	**272.09**

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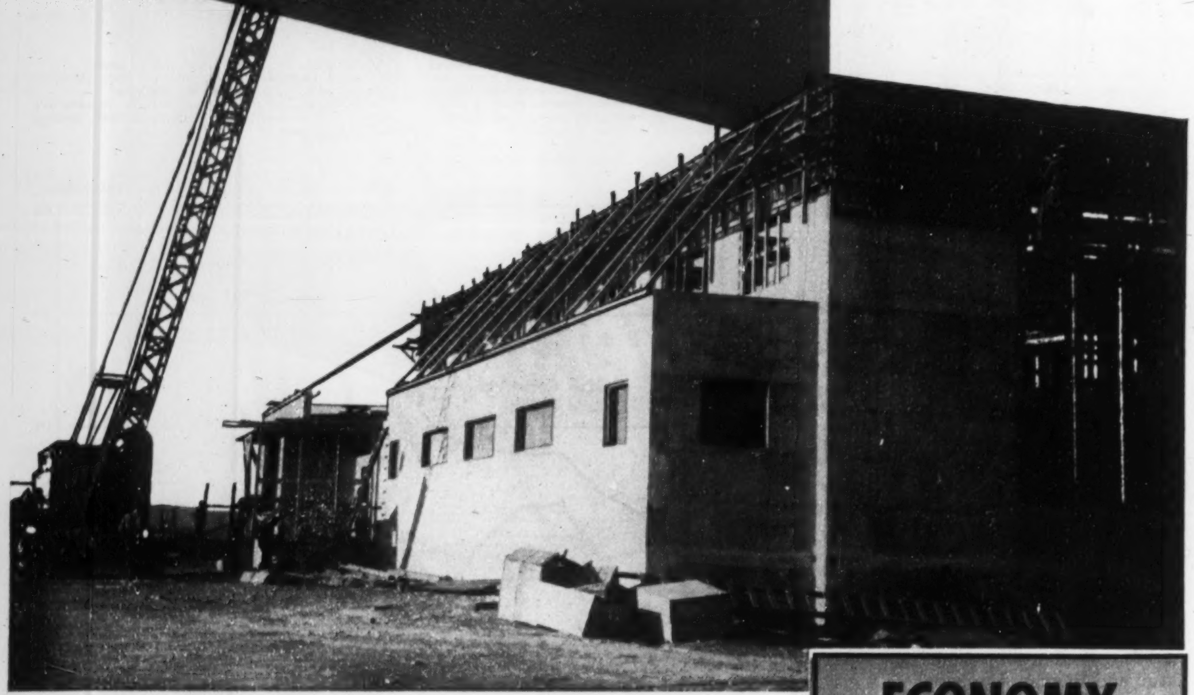

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METAL FORMS FOR CONCRETE CONSTRUCTION

Boeckh Index of building costs

E. H. Boeckh & Assoc., Inc., 1406 M Street, N. W., Washington, D. C.—U. S. average 1926-'29 = 100

Annual Averages By Cities	Residences		Apartments, Hotels, Office Bldgs. Brick and			Commercial & Factory Bldgs.		Brick and		
	Frame	Brick	Wood	Conc.	Steel	Frame	Steel	Wood	Steel	Conc.
U. S. AVERAGE										
1926–29	101.4	102.5	102.5	102.8	101.3	102.2	100.8	101.7	102.2	104.6
1939	101.2	104.4	104.1	111.2	109.4	101.3	110.4	105.0	112.1	113.3
1946	161.8	161.9	161.7	154.0	154.8	165.6	145.0	158.7	154.8	156.0
1949	213.8	215.6	215.0	208.1	208.4	218.4	195.5	211.9	208.7	211.4
1950	225.9	227.1	226.7	216.5	217.0	231.3	203.2	222.2	217.4	218.8
1953	252.7	256.9	256.4	251.8	250.0	258.0	238.2	253.6	254.4	257.6
June 1954	249.3	255.3	254.7	256.1	251.5	253.9	242.4	253.6	259.3	263.4
ATLANTA AREA										
1926–29	82.7	87.0	84.2	83.7	87.0	82.9	94.5	84.7	87.5	86.8
1939	82.8	86.0	86.1	95.1	95.0	80.6	96.2	88.6	94.6	97.4
1946	149.2	148.1	148.2	136.8	139.9	151.7	130.0	146.8	135.1	136.4
1949	189.9	189.3	189.3	180.6	185.4	191.7	172.7	186.5	177.5	180.8
1950	196.2	194.3	194.7	185.4	191.0	199.3	183.0	190.0	185.0	183.7
1953	224.6	223.3	223.4	221.3	226.3	228.9	223.4	218.1	223.0	221.8
June 1954	216.5	217.2	217.5	221.4	223.7	219.4	224.1	214.2	223.4	223.4
BALTIMORE AREA										
1926–29	107.2	112.0	107.6	100.6	100.7	106.3	95.5	106.8	96.8	101.2
1939	93.5	95.5	95.6	99.3	99.2	94.0	101.7	96.6	101.4	100.2
1946	163.1	161.7	162.2	149.1	150.8	167.6	138.9	158.8	150.0	148.2
1949	216.4	217.4	217.3	204.5	204.8	220.5	191.8	216.6	204.6	208.5
1950	231.0	231.8	232.1	215.0	216.8	234.9	204.2	230.6	217.7	216.5
1953	253.8	256.8	257.3	244.8	245.6	257.4	232.9	255.7	248.5	248.8
June 1954	248.0	251.5	251.9	244.1	243.8	251.3	234.2	250.7	248.8	248.2
BIRMINGHAM AREA										
1926–29	91.7	96.7	94.1	95.5	96.8	90.2	97.5	94.6	96.3	96.3
1939	87.8	90.9	91.5	96.1	96.2	84.9	96.9	95.1	95.6	96.3
1946	149.3	147.4	147.9	137.3	139.4	149.7	128.1	145.4	135.2	137.4
1949	188.2	187.2	187.6	178.9	182.0	192.8	172.6	183.7	177.7	180.0
1950	196.3	196.1	196.8	186.6	189.4	200.6	179.2	193.9	186.2	187.6
1953	221.1	222.1	222.2	215.9	218.4	224.3	208.0	220.1	215.9	219.9
June 1954	215.0	216.7	216.8	215.7	215.9	216.4	209.0	216.8	216.2	220.4
BOSTON AREA										
1926–29	116.3	120.3	115.4	106.2	107.0	118.8	106.3	112.5	108.7	105.8
1939	106.2	110.4	110.1	116.3	113.7	105.7	114.2	111.5	118.2	118.5
1946	167.0	166.5	166.0	156.8	156.6	172.1	147.1	161.1	158.5	160.4
1949	223.0	226.5	225.9	216.7	215.6	227.1	201.3	222.9	218.2	221.9
1950	234.6	237.8	236.8	227.3	225.5	240.3	210.9	231.8	229.8	232.5
1953	259.5	264.2	264.7	257.2	255.5	263.8	242.1	262.3	262.3	264.3
June 1954	255.3	264.0	263.7	262.9	258.3	259.5	248.8	263.1	270.3	273.2
CHICAGO AREA										
1926–29	109.2	114.2	109.8	113.2	109.1	112.9	105.2	105.9	112.0	116.0
1939	110.6	112.5	111.1	123.6	118.7	114.2	117.6	109.3	122.6	127.6
1946	168.3	166.0	164.2	158.9	156.9	168.1	144.5	157.4	157.0	162.5
1949	219.2	218.3	216.1	210.6	208.7	229.1	193.3	207.7	210.4	215.1
1950	231.9	229.7	227.4	217.8	216.8	243.4	201.2	216.5	219.5	222.6
1953	264.6	264.4	261.6	260.3	254.7	276.9	238.2	250.1	259.7	267.7
June 1954	263.5	266.2	263.2	269.5	260.3	276.1	246.5	254.2	269.9	279.9
CINCINNATI AREA										
1926–29	100.5	105.0	101.3	101.0	100.2	100.2	99.6	103.1	100.6	101.0
1939	103.3	106.2	105.9	113.9	110.4	103.3	111.7	107.1	113.7	116.5
1946	165.6	166.8	166.7	154.5	154.7	167.5	140.7	166.4	154.4	156.1
1949	214.1	216.6	215.8	207.5	206.0	217.9	193.5	214.1	208.4	212.2
1950	220.3	224.1	223.1	213.9	211.7	224.3	199.1	220.4	215.6	218.7
1953	250.2	257.7	256.4	252.5	247.5	253.3	234.2	257.6	254.6	261.0
June 1954	247.1	256.5	255.1	258.7	250.4	250.0	241.0	258.8	261.5	269.4
CLEVELAND AREA										
1926–29	107.2	113.4	108.5	111.3	108.3	109.0	103.0	107.2	110.5	114.8
1939	106.2	109.6	109.5	115.3	112.8	107.5	112.9	109.5	117.7	118.0
1946	169.2	169.4	168.7	160.2	159.9	174.1	146.4	164.3	161.0	165.9
1949	224.8	225.7	223.6	216.0	213.0	233.0	198.5	218.0	217.2	220.9
1950	237.9	237.8	235.4	227.8	224.1	248.1	207.2	227.6	228.4	232.3
1953	267.7	271.1	268.7	266.5	260.1	278.2	244.6	262.4	269.5	275.5
June 1954	264.5	270.3	267.9	272.2	263.4	274.6	250.7	263.5	275.9	282.6
DALLAS AREA										
1926–29	103.1	107.3	103.2	98.9	99.1	103.6	100.5	100.9	99.4	99.7
1939	95.1	95.8	96.7	98.8	100.2	94.8	106.6	96.0	101.9	98.9
1946	150.2	148.8	149.4	139.8	144.4	153.5	140.3	144.6	142.5	141.1
1949	207.2	206.2	206.9	197.1	201.3	210.3	197.1	203.2	201.5	195.4
1950	220.5	221.2	222.1	209.0	212.5	221.3	206.3	218.6	210.1	208.3
1953	243.7	245.9	247.4	239.9	240.1	245.2	246.5	243.5	246.1	241.8
June 1954	232.5	235.0	236.6	235.7	230.0	234.1	245.7	234.0	243.9	237.2
DENVER AREA										
1926–29	95.0	99.7	95.5	102.4	99.6	95.5	105.5	94.6	101.4	108.0
1939	112.1	112.0	111.2	116.1	114.4	114.3	118.7	109.5	117.0	117.8
1946	160.1	160.3	150.4	155.3	157.9	164.0	155.6	156.8	160.0	158.3
1949	212.9	215.8	215.9	211.0	213.1	216.2	207.0	214.3	214.6	215.3
1950	228.2	230.0	229.8	218.8	221.2	232.4	212.3	226.2	221.2	221.3
1953	254.0	259.6	259.4	255.0	254.5	256.6	246.8	258.8	258.1	260.9
June 1954	250.8	257.5	257.3	256.8	254.9	252.9	250.7	257.9	261.0	263.6
DETROIT AREA										
1926–29	103.3	108.4	104.3	102.9	102.4	103.7	103.1	103.5	103.3	104.4
1939	98.8	102.7	102.9	108.6	107.5	98.7	108.8	104.2	111.4	110.1
1946	165.9	165.9	165.8	157.4	157.9	171.3	147.5	160.9	160.0	159.7
1949	221.0	222.6	221.9	212.2	211.5	227.0	196.8	216.8	214.2	215.9
1950	233.0	234.0	233.3	222.8	222.0	240.0	208.1	227.1	226.0	225.7
1953	263.0	266.3	265.0	262.1	257.5	271.8	244.1	259.1	266.1	269.7
June 1954	264.3	270.9	269.2	274.4	266.1	272.3	254.0	265.2	278.0	284.4
KANSAS CITY AREA										
1926–29	100.3	106.5	102.2	105.7	103.3	101.1	105.9	101.9	107.5	108.8
1939	104.4	109.9	109.8	118.3	115.4	103.8	117.2	113.0	120.0	121.6
1946	166.5	165.6	165.4	158.2	159.5	172.3	151.0	159.8	159.3	160.3
1949	215.9	216.7	216.3	209.0	211.1	221.8	199.4	210.0	211.3	211.5
1950	230.5	229.6	228.7	216.0	218.8	238.1	203.6	219.6	217.7	217.8
1953	260.1	264.1	263.2	254.2	253.1	267.1	234.1	258.0	258.1	262.1
June 1954	254.1	259.9	259.0	256.9	252.8	260.3	242.6	255.9	259.9	261.8
LOS ANGELES AREA										
1926–29	92.7	97.9	93.5	98.8	96.8	93.5	97.0	91.3	97.5	103.1
1939	93.6	97.2	97.5	103.7	105.0	95.6	109.5	96.8	106.2	104.9
1946	155.1	156.1	156.2	155.3	156.7	160.1	158.3	150.9	160.0	158.7
1949	203.2	207.0	206.0	209.9	210.7	205.3	201.2	201.8	210.2	212.4
1950	222.8	224.1	223.4	217.4	219.2	227.8	205.5	215.4	217.5	219.0
1953	246.5	250.5	249.6	252.3	251.3	252.7	242.4	243.2	255.3	258.2
June 1954	243.3	248.6	247.9	254.2	251.9	249.1	246.3	242.8	258.2	261.6
MINNEAPOLIS AREA										
1926–29	92.8	98.2	94.6	95.6	96.1	92.8	100.0	93.9	97.9	98.4
1939	101.9	105.0	104.2	113.5	110.7	102.7	113.4	103.6	114.5	117.2
1946	163.7	167.6	167.5	156.5	155.7	164.9	142.6	168.2	157.2	159.5
1949	218.7	218.7	217.7	205.1	206.9	224.4	192.6	211.7	205.8	208.0
1950	228.2	227.9	227.0	210.1	213.2	234.4	198.2	220.3	215.6	211.3
1953	258.8	263.9	263.2	250.7	251.5	263.4	236.6	261.8	256.1	259.1
June 1954	256.3	263.9	263.1	257.7	253.7	260.2	242.5	264.5	262.7	266.5
NEW ORLEANS AREA										
1926–29	93.3	96.3	93.4	86.5	90.6	93.3	93.7	91.5	89.5	86.5
1939	89.0	90.3	91.3	95.4	98.3	88.1	102.8	91.7	98.5	94.9
1946	148.9	147.4	148.2	138.6	142.8	151.2	138.7	145.4	142.0	138.7
1949	201.6	201.4	202.0	188.8	194.6	204.9	186.0	200.0	191.8	189.8
1950	211.7	210.3	211.0	196.2	203.1	215.8	194.4	206.4	199.5	195.3
1953	236.6	236.6	237.1	226.0	231.7	241.4	221.4	233.1	229.3	226.9
June 1954	230.0	232.8	233.3	229.1	232.4	233.7	224.0	232.0	232.4	231.9
NEW YORK CITY AREA										
1926–29	133.3	138.4	131.9	122.8	120.4	137.5	113.1	127.4	123.2	125.3
1939	122.1	123.3	122.5	130.6	125.9	125.6	123.7	119.6	130.0	133.3
1946	182.4	181.8	181.1	177.2	174.6	188.1	158.6	177.4	174.8	179.0
1949	240.8	243.7	242.7	242.8	238.2	247.5	217.3	238.3	240.0	246.4
1950	254.5	256.2	255.2	249.5	246.1	262.1	224.2	249.7	248.0	251.5
1953	277.2	281.3	280.9	281.0	275.7	283.7	259.8	275.4	282.0	286.0
June 1954	278.1	285.2	284.4	293.6	284.6	284.5	271.1	280.7	295.4	201.8
PHILADELPHIA AREA										
1926–29	100.3	106.3	103.7	105.9	103.1	98.1	101.9	104.2	104.1	107.5
1939	99.2	102.6	102.9	105.7	104.1	98.2	102.0	105.0	105.5	106.7
1946	165.0	163.9	164.9	153.2	154.6	169.0	141.2	161.1	152.7	154.0
1949	220.5	220.6	220.3	209.0	209.0	224.3	190.3	216.3	205.6	209.9
1950	234.4	235.1	234.8	221.2	220.7	239.3	202.0	230.5	218.8	222.8
1953	262.8	266.1	265.8	257.9	254.9	266.8	237.6	262.9	257.5	261.4
June 1954	262.0	268.2	267.1	265.0	258.0	265.7	238.1	268.0	261.8	272.2
PITTSBURGH AREA										
1926–29	113.3	118.8	112.8	111.2	107.1	115.4	89.6	112.2	104.6	112.9
1939	113.8	117.0	115.7	117.5	114.2	114.2	109.8	116.5	116.9	119.1
1946	169.5	169.0	168.0	156.6	155.3	173.5	140.1	166.4	153.2	158.9
1949	227.1	229.1	227.7	215.6	212.2	231.3	186.9	227.0	209.8	219.8
1950	237.6	238.6	237.6	222.2	219.8	242.6	196.6	235.3	218.9	224.2
1953	265.9	269.9	268.7	258.6	253.8	271.2	231.3	267.8	257.4	263.5
June 1954	262.2	268.5	267.7	262.6	256.5	265.8	236.3	269.5	262.8	268.7
ST. LOUIS AREA										
1926–29	118.6	121.1	115.7	109.9	108.8	121.3	103.3	111.7	107.7	109.3
1939	107.0	110.2	109.9	118.7	116.4	107.6	114.3	110.3	119.2	119.8
1946	167.4	167.1	166.2	159.1	158.9	171.7	145.3	154.8	158.1	161.1
1949	220.7	221.4	220.7	212.8	212.4	226.8	197.5	217.3	213.6	215.7
1950	230.7	232.8	233.7	221.9	220.9	240.1	204.7	229.5	222.8	225.3
1953	256.4	263.4	264.6	259.0	254.0	266.5	237.9	263.4	259.2	267.6
June 1954	258.3	265.2	263.7	264.3	257.0	264.5	243.5	263.7	265.9	273.6
SAN FRANCISCO AREA										
1926–29	87.7	93.7	90.4	97.5	96.5	86.1	95.5	91.8	95.9	99.0
1939	99.2	105.7	104.5	117.4	114.4	97.6	114.9	107.4	116.5	121.9
1946	157.5	159.7	160.0	157.9	159.0	160.5	151.5	158.4	160.0	159.3
1949	207.1	213.0	212.8	214.0	213.9	210.0	203.9	213.9	216.1	219.8
1950	223.1	227.0	226.8	222.4	222.9	226.1	209.1	224.5	222.6	224.5
1953	257.2	255.2	246.5	256.6	254.7	252.8	244.7	253.9	259.7	261.6
June 1954	249.5	257.2	256.2	263.3	258.6	253.6	248.3	256.0	265.8	270.8
SEATTLE AREA										
1926–29	84.5	92.2	89.2	101.7	95.1	82.4	100.8	92.2	100.5	105.9
1939	96.7	104.4	103.8	119.2	114.9	94.4	115.1	108.3	118.7	125.3
1946	152.9	158.3	157.9	161.2	159.8	154.3	156.0	158.9	164.2	167.1
1949	203.9	214.2	214.0	220.7	218.1	205.2	209.9	218.0	225.3	228.5
1950	213.6	224.1	224.0	227.1	224.7	214.3	214.1	227.8	230.3	234.5
1953	239.0	254.8	254.7	262.7	258.2	237.4	249.0	263.1	269.5	273.6
June 1954	235.0	251.6	251.6	264.8	257.6	233.5	251.2	260.8	271.5	276.9
WASHINGTON, D. C.										
1926–29	106.6	107.7	107.9	107.1	105.9	106.0	104.0	108.0	106.4	108.4
1946	168.5	166.2	167.1	157.1	158.2	173.6	145.2	162.6	157.2	156.6
1949	223.1	223.3	223.1	213.5	212.6	227.2	194.8	218.6	210.4	214.6
1950	235.0	233.7	233.8	223.2	224.5	240.5	210.2	227.5	223.8	222.0
1953	259.5	259.7	260.0	251.7	252.3	264.3	240.4	253.3	255.3	253.8
June 1954	253.8	255.7	256.4	254.4	251.9	259.7	242.8	251.9	257.4	258.5

Current indexes are calculated upon an actual survey at source of local construction cost conditions. Material prices used are those paid by contractors to material dealerc. Labor rates are current rates paid by contractors — certain corrections being made in certain areas for labor efficiency and labor shortage. Index includes construction overhead, sales taxes, compensation insurance and social security. The indexes have been primarily engineered to use as local cost conversion factors to construction cost data released by the Boeckh organization. Complete formula is published in "Boeckh's Index Calculator Tables."

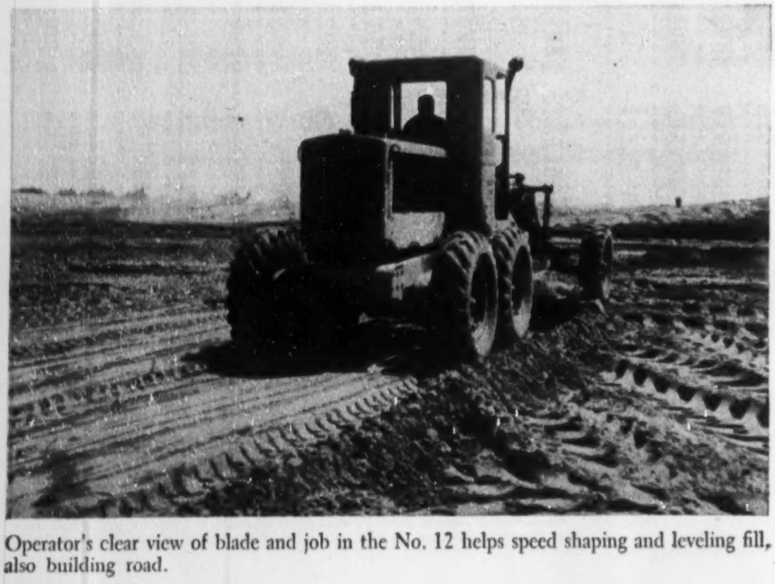
Where Boeckh index is shown in these pages on charts or tables for comparison with other building cost indexes, the average for all five Boeckh commercial and factory building indexes is used, converted to 1913 = 100.

CATERPILLAR

$80,000,000 construction for Plattsburg jet bomber base

Rugged yellow machines and engines help speed 3,882,500 cu. yds. of excavation for 10,000-ft. runway and other projects

Matched Caterpillar equipment saves seconds every cut—a D8 push-loads a high-speed, big-capacity DW21 in sandy clay.



Operator's clear view of blade and job in the No. 12 helps speed shaping and leveling fill, also building road.

Keeping on schedule is the order of the day, every working day, on the $80,000,000 Air Force Base project, Plattsburg, N. Y. Construction involves clearing, leveling and paving a 10,000-ft. runway, taxiways and parking apron, relocating two miles of single-track railroad as well as building hangars, barracks, offices, jet fueling plant and water and sewage facilities. When the base is activated in the fall of 1955, a Strategic Air Command jet bomber wing of forty-five B-47s and twenty KC-97 tankers will be stationed here.

The historic site of Plattsburg Barracks, one of the oldest military installations in the United States, is the scene of hustling activity under the supervision of the Corps of Engineers. To maintain schedule (operating two 8-hour shifts per day), contractors are relying heavily on rugged yellow track and wheel-type tractors, scrapers, bulldozers, motor graders, engines and other specialized earthmovers—standardization that is paying off in all phases of the project.

Working on construction of the runway, taxiways and apron, which involves 3,410,000 yds. of excavation, Dutcher Construction Corporation, Queenstown, Md., has a fleet of fifteen DW21s, eighteen D8s and five No. 12s. Fill is 27 ft. at the deepest point. Hauls vary from 1800 ft. to 6100 ft. one way, with the DW21s averaging 18 cu. yds. of very sandy clay per load. A D4600 Engine powers a shovel piling brush for burning, while two D3400 Electric Sets provide electricity for night lighting.

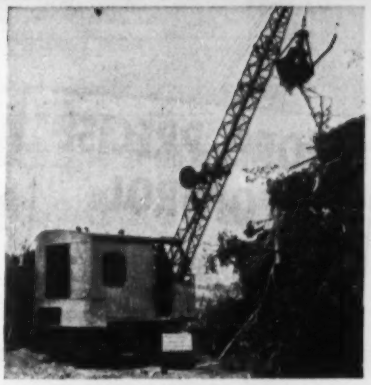
On another phase of the project, laying 63,000 ft. of 38-in. drain pipe, Winkelman-Tompkins-Jones, Plattsburg, prime contractor, is using a D8,

a PD4 Pipe Layer, a No. 6 Shovel, an HT4 Shovel and a D13000 powering an excavator. Working on the hangar area, C. D. Perry & Sons, also of Plattsburg, is employing seven D8s, four No. 80 Scrapers, one D7, two D4s and three DW20 Tractors with Scrapers. The Frederick Raff Co., Inc., is using two D8s and Scrapers and a D6.

Concerning performance, D. J. Dutcher, vice president of his outfit, says: "It has been my experience that Caterpillar* equipment is more dependable and stays on the job better than any other make. The complete line of Caterpillar-built machines offers me the right equipment for every job. Wherever I go, I find it backed up by good parts and service." Charles Wilber, superintendent for C. D. Perry & Sons, reports: "Because of their low maintenance cost, ease of operation, dependability, excellent service and parts facilities and ability to operate in any weather, I am very well satisfied with our Caterpillar units."

Standardizing on CAT*-built equipment has other advantages, too. Many parts are interchangeable, cutting down time and parts inventory. Operators and machinists, familiar with one make of machinery, get more work out of it. And the nearby Caterpillar Dealer provides time-saving, money-saving one-stop service whenever needed. See him—ask him to show you how you'll profit more by standardizing on Caterpillar equipment.

Building access road, D8 with No. 80 Scraper handles 20 cu. yds. a load on 1200-ft. one-way hauls.



Piling brush for burning, this shovel gets dependable, low-cost power from its honestly rated Cat D4600 Engine.

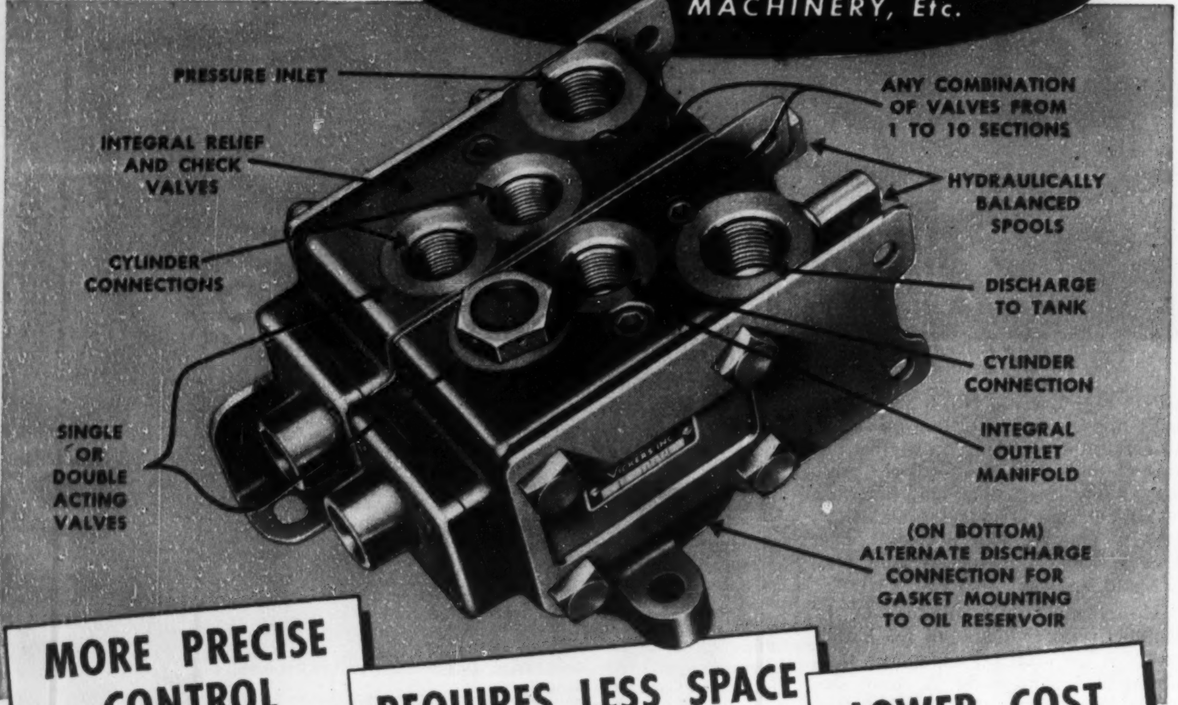
Versatile Cat HT4 Shovel backfills trench, while a D4 with PD4 Pipe Layer (not shown here) lays 38-in. pipe.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS, U. S. A.

*Both Cat and Caterpillar are registered trademarks—®

NEW! Series CM11 VICKERS MULTIPLE UNIT VALVES

For MATERIALS HANDLING EQUIPMENT,
FARM TRACTORS, BUCKET LOADERS,
CONSTRUCTION and MINING
MACHINERY, Etc.



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INTEGRAL RELIEF AND CHECK VALVES
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SINGLE OR DOUBLE ACTING VALVES
ANY COMBINATION OF VALVES FROM 1 TO 10 SECTIONS
HYDRAULICALLY BALANCED SPOOLS
DISCHARGE TO TANK
CYLINDER CONNECTION
INTEGRAL OUTLET MANIFOLD
(ON BOTTOM) ALTERNATE DISCHARGE CONNECTION FOR GASKET MOUNTING TO OIL RESERVOIR
VICKERS INC.

MORE PRECISE CONTROL

Improved Metering Characteristics

REQUIRES LESS SPACE

New Combination Operating-Valve and End-Plate Sections

LOWER COST

Simplified Design and Construction

New, compact, more versatile design of valve. End sections combine in one casting the inlet or outlet manifold plate together with any operating-valve section. Inlet section also contains relief valve. Individual outlet plates available for single unit valves. Single- and double-operating valve sections can be added between end sections as needed. Valve can be adapted for tandem (series) operation. Single-acting valves available for either direction of lever shift.

Other features include protection of pump from reverse flow during shifting . . . three point mounting for more simple installation . . . cylinder connections with ¾-16 N.F.-2 straight threads (AND 10050 type) which conform to SAE standards help insure leak-proof connections . . . optional outlet ports in end section so valve can be gasket mounted to the oil reservoir or pipe connected. Designed for use with Vickers Series V-200 Vane Pumps (up to 11 gpm), the CM11 Valve can be used up to 2000 psi working pressure. For further information write for Installation Drawing M168643.

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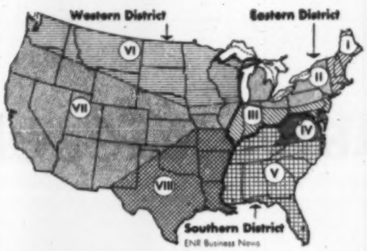
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921



Railroad cost index road construction

Interstate Commerce Commission—1910-14 = 100

Dist & Reg..	%	1926	1932	1939	1945	1949	1952	1953
I to VIII....	**68.40**	**166**	**131**	**137**	**197**	**270**	**308**	**319**
I East...	73.72	173	134	140	206	287	323	333
II East...	66.47	168	133	141	202	283	320	330
III East...	65.37	168	132	144	205	286	325	335
IV South..	63.48	163	126	131	195	259	299	310
V South..	68.79	164	129	136	195	265	304	315
VI West...	72.27	164	129	132	190	253	296	307
VII West...	68.79	166	131	133	188	256	296	306
VIII West..	71.97	167	133	140	198	270	305	316

Indexes represent territorial index factors and are not for determining unit reproduction costs for individual roads.

By Accounts	1926	1932	1939	1945	1949	1952	1953
Engineering........	166	131	137	197	270	308	319
Other rt of way exp	159	121	135	201	258	308	309
Grading..........	153	106	90	144	139	149	154
Tunnels & subways.	178	119	140	236	339	380	379
Brdg. culv & trestl...	170	122	149	240	374	433	434
Elevated str uctures..	165	129	149	249	382	466	468
Ties..............	173	144	158	241	302	357	358
Rails..............	144	140	136	152	245	285	311
Other track material	177	163	167	176	278	307	331
Ballast..........	175	146	143	181	254	277	288
Trk laying & surf...	188	164	165	273	366	411	427
Fences snw sheds...	178	147	141	189	279	333	343
Stat & off bldgs.....	184	141	166	244	368	426	438
Roadway buildings..	187	140	162	258	386	428	439
Water stations......	182	147	166	227	327	367	379
Fuel stations.......	180	144	159	242	357	401	415
Shops & eng houses.	185	137	165	248	379	432	446
Grain elevators.....	190	137	164	236	367	423	437
Storage warehouses.	189	137	166	253	377	439	452
Wharves & docks...	177	136	153	255	350	410	404
Coal & ore, wharves.	174	136	153	236	341	393	395
Tel & tel lines......	157	121	129	173	250	300	315
Sgnls & intrlocks...	169	130	143	176	226	271	290
Power plants.......	186	138	167	246	386	456	472
Powr trnsmissn sys.	176	143	148	180	266	322	331
Misc struct........	186	141	161	229	378	433	445
Roadway mach.....	151	138	154	187	270	320	332
Roadway small tools	190	155	180	200	315	385	400
Public impr const...	169	131	142	217	321	356	358
Shop mach.........	186	155	202	236	324	375	387
Power plant mach...	186	155	180	191	242	290	297
Work equipment....	180	165	200	254	348	400	422

Ratio of RR costs, 1953

	%
Road construction......................	68.40
Equipment, work......................	0.49
Equipment, rolling & floating..............	24.54
General..............................	6.57
Total................................	100.00

Indexes released August 16, 1954, by Engineering Sect. Bu. of Accounts, Cost Finding and Valuation, Interstate Commerce Commission, include items developed from analysis of major construction contracts over a period of years. Indexes for material accounts are based on studies of carriers' returns to Valuation Order 14, joint studies made with various sub-committees of President's Conference Committee, engineering publications, contracts covering major construction projects and information furnished by individual carriers.

Handy-Whitman Index—public utility costs

Whitman, Requardt and Associates, Baltimore, Md.

Individual series for 103 cost elements in three classes of utility construction, for six geographic divisions of the United States, are reported semi-annually. Weighting is based on wide experience in cost analysis of plants and construction. Material prices are from ENGINEERING NEWS-RECORD, Iron Age and various manufacturers; labor rates from BLS, unions and builders associations.

Building construction—1911 to 1914 = 100

(Complete Index reports 14 Items entering into Building Construction Costs.)
A relates to Reinforced Concrete Bldg.; B relates to Brick Bldg.

	Jan. '26	July '26	Jan. '32	July '32	Jan. '39	July '39	Jan. '42	July '42	Jan. '45	July '45	Jan. '49	July '49	Jan. '50	July '50	Jan. '51	July '51	Jan. '52	July '52	Jan. '53	July '53	Jan. '54	July '54
North Atlantic Division																						
A	213	213	171	159	205	207	250	253	259	260	436	433	437	448	473	479	481	485	496	519	526	534
B	228	229	189	173	211	214	246	250	262	265	429	421	424	436	460	474	474	479	485	503	511	523
South Atlantic Division																						
A	213	215	171	164	204	205	260	267	274	275	462	453	465	469	491	510	510	517	527	556	562	569
B	226	228	185	176	209	211	255	262	272	277	431	431	434	439	456	485	485	488	494	516	524	536
North Central Division																						
A	203	201	169	154	200	200	237	242	249	253	421	418	423	437	463	468	472	481	492	520	519	526
B	212	211	181	164	203	203	229	234	248	250	389	390	394	408	433	440	442	453	459	483	487	497
South Central Division																						
A	192	191	149	144	188	187	232	236	242	243	411	412	418	422	445	454	454	460	471	494	499	504
B	203	204	160	154	191	191	223	227	235	238	382	382	387	392	408	424	426	438	445	460	466	474
Plateau Division																						
A	198	197	153	149	194	194	230	235	238	239	402	397	400	417	435	451	451	456	471	480	479	495
B	211	210	167	163	199	200	221	227	231	233	396	395	396	410	427	442	443	447	458	464	465	481
Pacific Division																						
A	191	190	157	148	192	192	238	241	248	248	416	415	420	432	458	463	466	468	477	501	501	518
B	198	197	164	156	193	193	226	231	241	242	386	385	389	400	419	435	438	443	448	466	465	479

Gas plant construction—1911 = 100

(Complete Index reports 25 Items entering into Gas Plant Construction Costs.)
A relates to Total Constr. & Equip.; B relates to Mech. Equip. Exclusive of Gas Holders

	Jan. '26	July '26	Jan. '32	July '32	Jan. '39	July '39	Jan. '42	July '42	Jan. '45	July '45	Jan. '49	July '49	Jan. '50	July '50	Jan. '51	July '51	Jan. '52	July '52	Jan. '53	July '53	Jan. '54	July '54
North Atlantic Division																						
A	230	230	202	188	241	249	272	275	283	288	469	464	467	476	514	519	527	536	540	561	577	589
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	549	553	554	567	590	606	609
South Atlantic Division																						
A	219	222	178	175	227	230	261	268	278	282	464	453	456	457	492	507	510	520	525	543	560	568
B	212	212	209	195	274	278	297	299	296	301	481	482	479	485	549	549	553	554	567	590	606	609
North Central Division																						
A	217	218	198	178	232	232	249	254	264	269	435	434	437	447	481	489	491	503	508	531	545	554
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	549	553	554	567	590	606	609
South Central Division																						
A	199	200	171	160	216	217	244	249	258	261	420	419	425	429	465	470	474	475	479	496	510	522
B	212	212	209	195	274	278	297	299	296	301	447	487	479	485	549	549	553	554	567	590	606	609
Plateau Division																						
A	202	202	176	166	216	217	232	237	240	243	403	398	401	405	440	449	453	460	467	476	489	501
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	549	553	554	567	590	606	609
Pacific Division																						
A	205	206	187	177	227	228	253	257	264	266	433	428	433	437	475	480	489	494	498	516	529	544
B	212	212	209	195	274	278	297	299	296	301	447	481	479	485	549	549	553	554	567	590	606	609

Electric light and power construction—1911 = 100

(Complete Index reports 64 Items entering into Electric Light and Power Construction Costs.)
A relates to Total Constr. & Equip. All Steam; B to Accessory Electric Equipment; C to Sub-sta. Equip.

	Jan. '26	July '26	Jan. '32	July '32	Jan. '39	July '39	Jan. '42	July '42	Jan. '45	July '45	Jan. '49	July '49	Jan. '50	July '50	Jan. '51	July '51	Jan. '52	July '52	Jan. '53	July '53	Jan. '54	July '54
North Atlantic Division																						
A	197	194	182	176	224	225	248	248	251	259	401	400	399	409	462	468	472	480	481	506	509	517
B	197	196	192	186	225	224	241	239	226	237	340	341	341	360	413	420	420	430	426	457	457	460
C	184	178	172	168	203	203	217	216	207	218	306	312	312	320	352	359	359	366	365	392	392	396
South Atlantic Division																						
A	201	201	188	180	232	233	262	267	268	273	430	422	422	430	482	490	494	504	506	536	539	547
B	200	203	200	191	239	240	260	262	247	248	357	356	358	374	426	431	432	442	438	474	474	482
C	187	183	180	173	217	218	235	237	227	228	322	325	327	333	365	370	370	377	377	409	409	417
North Central Division																						
A	190	187	186	174	219	218	235	238	238	243	375	374	374	382	436	443	446	456	458	489	488	495
B	189	188	199	186	224	223	229	231	216	218	309	307	310	324	376	382	388	391	388	419	418	424
C	178	171	181	169	203	202	207	209	198	200	278	280	282	286	320	326	328	333	332	359	359	364
South Central Division																						
A	184	183	179	171	218	218	245	246	248	251	391	390	390	398	448	454	458	465	468	496	498	506
B	187	189	200	190	231	230	250	248	235	235	341	340	340	357	407	415	416	423	420	453	454	460
C	175	171	181	173	210	209	226	226	217	217	310	311	311	319	344	352	352	356	356	385	386	392
Plateau Division																						
A	190	188	177	171	218	219	234	236	238	241	378	378	376	386	436	443	447	454	460	482	484	493
B	197	196	194	188	231	232	237	236	225	225	322	323	323	341	390	399	401	408	407	437	435	440
C	185	177	175	171	209	211	213	212	207	207	289	294	294	302	332	341	342	347	348	374	374	378
Pacific Division																						
A	180	178	172	163	21	215	235	242	242	244	383	380	379	389	440	450	454	459	461	486	487	495
B	178	177	182	170	222	222	231	240	225	225	328	323	323	343	394	408	409	413	409	437	436	438
C	167	161	164	155	203	202	210	219	208	208	298	297	297	307	342	357	357	359	358	382	382	384

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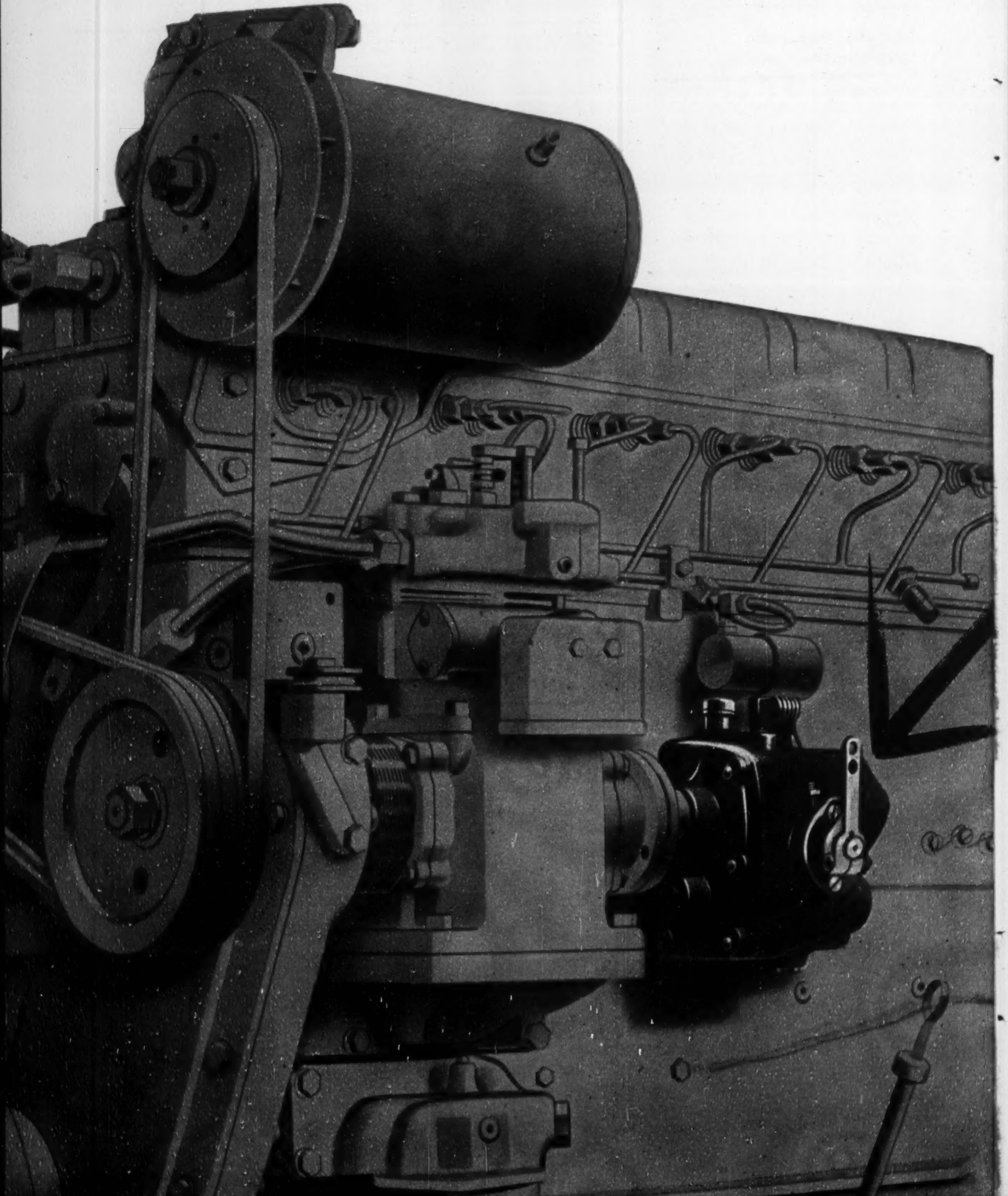

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The new double flexible seals on Jeffrey PERMASEAL Belt Idlers are hailed as the greatest advance in conveying engineering in the last 20 years.

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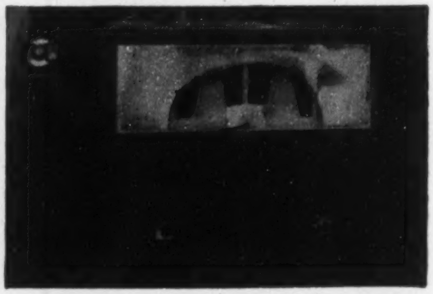

Airborne-dust test in Jeffrey Research Laboratory (unretouched).

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Irrigation and hydro-power construction cost indexes—1949-51=1.0

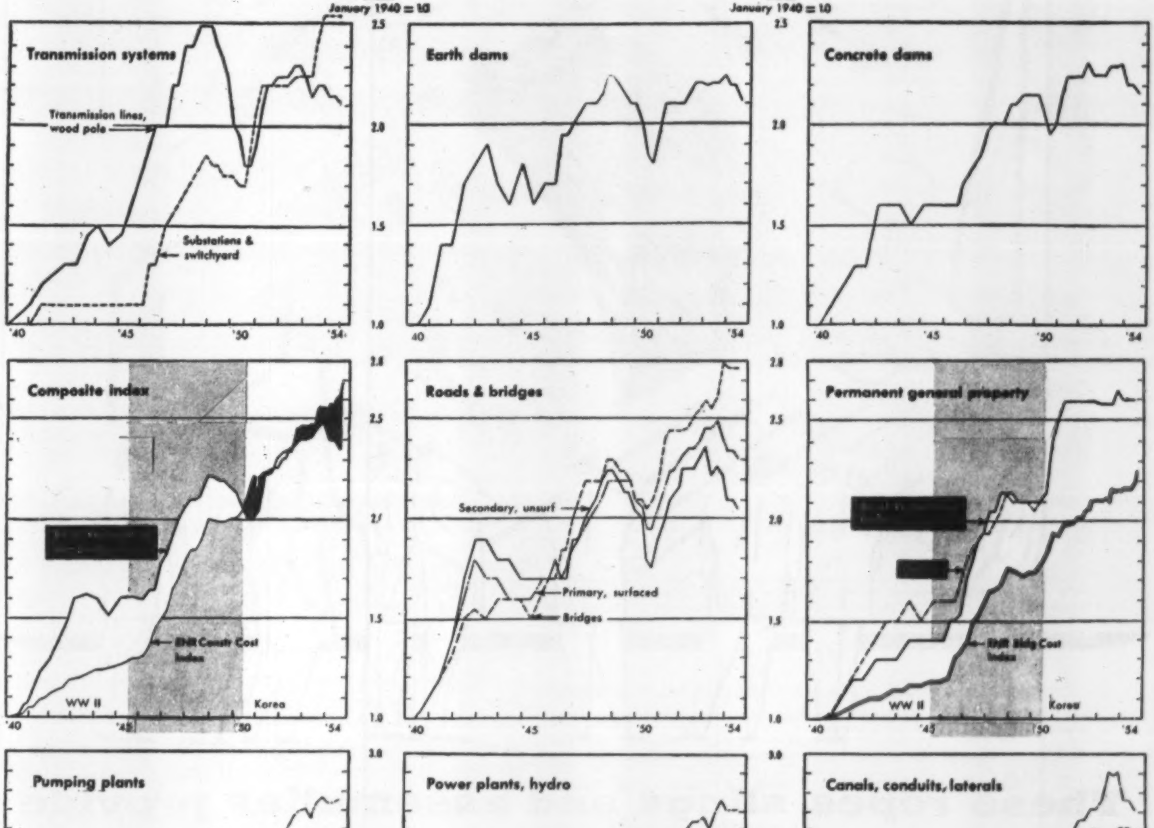
U. S. Bureau of Reclamation, Office of Assistant Commissioner and Chief Engineer, Denver, Colo.

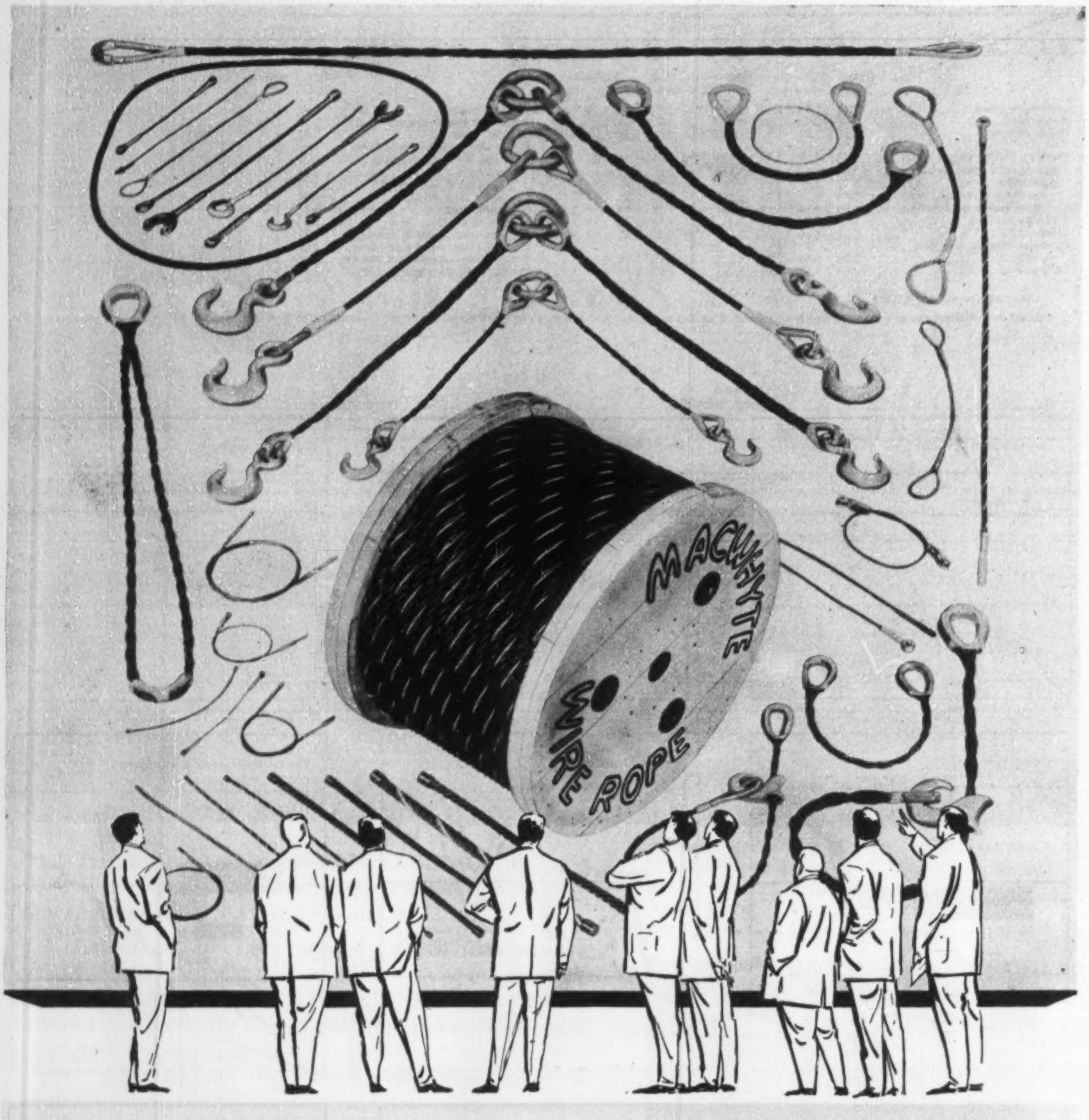
	Conv. fact*	1952 July	1953 Jan.	1953 Apr	1953 July	1953 Oct.	1954 Jan	1954 Apr	1954 July
Composite Index	2.12	1.12	1.13	1.14	1.16	1.17	1.13	1.13	1.11
Dams, earth	2.00	1.10	1.09	1.10	1.10	1.12	1.09	1.09	1.06
Dams, concrete	2.11	1.07	1.07	1.08	1.08	1.09	1.04	1.04	1.02
Pumping plants, bldg & equip	2.06	1.19	1.18	1.18	1.19	1.24	1.24	1.24	1.24
struct, reinf concr, & imprv	2.31	1.15	1.17	1.15	1.18	1.20	1.18	1.18	1.19
equipment	1.81	1.22	1.23	1.23	1.23	1.29	1.29	1.29	1.29
pumps & prime movers	1.80	1.22	1.28	1.28	1.28	1.34	1.34	1.34	1.35
acces elec & misc equip	1.86	1.18	1.12	1.13	1.15	1.18	1.19	1.20	1.20
discharge pipes	2.18	1.19	1.21	1.21	1.25	1.31	1.30	1.30	1.28
Canals	2.16	1.16	1.18	1.18	1.14	1.16	1.13	1.13	1.11
Conduits, tunnels, free flow, concr lined	2.26	1.15	1.13	1.13	1.13	1.16	1.16	1.16	1.13
Laterals and drains	2.42	1.12	1.14	1.20	1.19	1.20	1.14	1.14	1.12

	Conv fact*	1952 July	1953 Jan	1953 Apr	1953 July	1953 Oct	1954 Jan	1954 Apr	1954 July
Primary roads	2.08	1.13	1.18	1.18	1.19	1.16	1.13	1.13	1.11
Secondary roads, unsurf	1.98	1.14	1.19	1.12	1.14	1.12	1.05	1.05	1.03
Bridges, steel	2.18	1.15	1.19	1.17	1.20	1.28	1.27	1.27	1.27
Power plants, hydro, bldg & eq	1.98	1.19	1.21	1.21	1.22	1.25	1.24	1.25	1.25
structs, reinf concr, imprv	2.28	1.16	1.17	1.15	1.18	1.21	1.19	1.19	1.19
equipment	1.83	1.20	1.23	1.25	1.25	1.28	1.28	1.28	1.28
turbines & generators	1.80	1.22	1.27	1.29	1.28	1.31	1.31	1.31	1.32
acces elect equip	1.84	1.20	1.15	1.16	1.18	1.21	1.22	1.23	1.23
misc equip	1.95	1.13	1.15	1.15	1.15	1.18	1.17	1.17	1.17
penstocks	2.18	1.19	1.21	1.21	1.25	1.31	1.30	1.30	1.28
Transm switchyards & substa	2.03	1.10	1.11	1.11	1.19	1.37	1.37	1.37	1.37
Transm. lines, wood pole 115kv	2.02	1.13	1.11	1.06	1.09	1.09	1.06	1.06	1.05
Transm lines, steel tower 230 kv	1.91	1.13	1.14	1.14	1.18	1.20	1.18	1.18	1.18
Permanent genl property, bldgs	2.26	1.15	1.14	1.14	1.14	1.17	1.15	1.15	1.15

* Multiplier to convert to 1940 = 1.0

Based on combined costs of material and labor furnished by the contractor, and material and labor furnished by the government on B of R projects in 17 western states and Alaska





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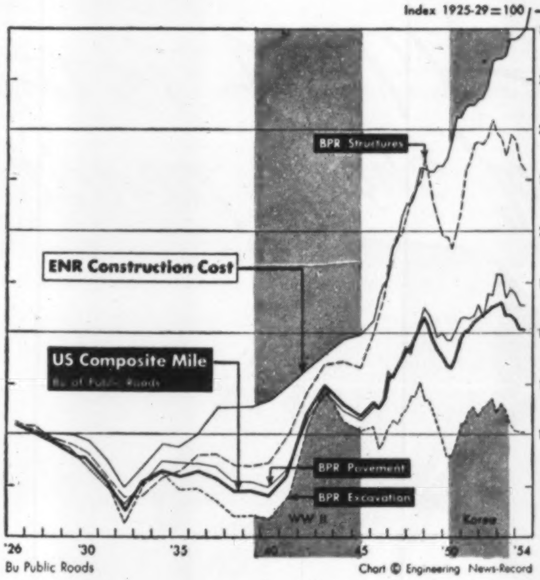


Bu Public Roads

Chart © Engineering News-Record

National and state price indexes spot highway bidding trends

How highway construction bid prices average out across the country is measured by the composite standard mile price index computed by the Bureau of Public Roads. The structure and movements of this index are shown in the accompanying table and chart which dramatize the sharp reduction in bid prices in 1954 in the face of a continued rise in costs.

The pavement and excavation curves on the chart illustrate the success of mechanization in holding prices down in the face of rising costs for labor and materials. These two classes of construction, for example, are much more highly mechanized than structures whose curve marks a considerably higher rise in prices.

• **The states** are showing both originality and statistical thoroughness in developing their own price indexes tailored to measure trends in prices affecting their local and peculiar conditions. Some use composite miles that reflect averages for their highway systems, some use total quantities of major classes of construction, some use a standard project that is repriced and some weight by percentages. Some select a few major classes of work and some reprice many and develop a series of sub-indexes.

The price movements measured by these indexes are charted on one of the colored pullout inserts in this issue and they are described in the pages which follow.

On the charts the highway price indexes are compared both with the BPR national composite mile price trend and with the closest ENR regional construction cost index. In several states prices stiffened some in the second quarter of 1954, but by and large all agree that higher productivity in 1954 is the rule, with bid prices way below their '51 and '52 peaks even though costs are up.

• **Pennsylvania** uses a typical project of 1940 as the base for weighting its highway bid price index then adjusts the quantities each year to represent the weighted average of that year's operation. Thirty items are priced annually. In effect this is a composite mile adjusted for design changes. C. N. Smith is Cost Engineer for the Department of Highways.

Highway price index—composite standard mile

U. S. Bureau of Public Roads, 1925-29 = 100

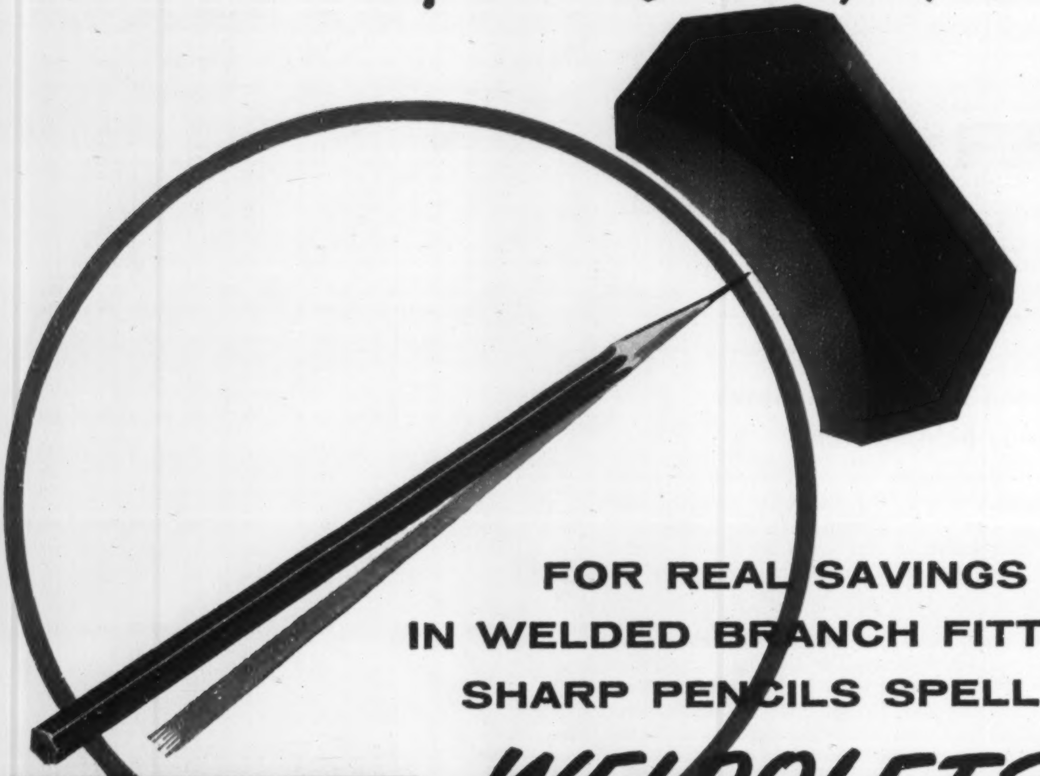
Year	Excavation[1] 17,491 cy[*] Bid price[3]	Excavation Sub-index	Surfacing[2] 3,728 sy[*] Bid price[3]	Surfacing Sub-index	Structures: Reinf. steel 16,000[*] lb. Bid price[3]	Structures: Struct. steel 4,325[*] lb. Bid price[3]	Structures: Struct. concr. 68[*] cy Bid price[3]	Comb. Sub-index	Composite mile index
Base 25-'29=100	$0.35†	100.0	$2.22†	100.0	$0.052†	$0.067†	$22.15†	100.0	100.0
1928	.36	103.7	2.29	103.1	.053	.074	22.76	103.7	103.4
1930	.30	86.3	1.86	84.1	.045	.061	20.08	89.4	85.7
1932	.18	55.0	1.44	64.8	.034	.046	15.33	68.0	61.0
1939	.21	59.8	1.73	77.8	.044	.059	19.13	85.9	72.6
1940	.21	59.2	1.68	75.6	.045	.063	19.17	87.6	71.6
1941	.24	69.2	1.87	84.1	.054	.076	21.44	100.8	81.4
1942	.37	104.1	2.39	107.9	.065	.090	26.16	122.3	108.8
1943	.44	124.0	2.71	122.3	.067	.095	30.19	134.4	124.9
1944	.37	106.6	2.45	110.6	.064	.089	31.94	136.5	113.1
1945	.36	101.6	2.38	107.4	.062	.077	31.62	132.5	109.0
1946	.35	99.1	2.65	119.3	.075	.113	38.79	164.7	119.0
1947	.38	108.4	3.01	135.5	.093	.132	45.84	196.9	135.0
1948	.42	119.3	3.37	151.9	.108	.158	51.00	223.9	151.2
1949	.38	107.4	3.40	153.1	.104	.146	47.36	210.3	145.8
1950;	**.33**	**94.5**	**3.32**	**149.8**	**.100**	**.139**	**44.62**	**199.4**	**137.7**
1Q	.31	88.6	3.24	146.1	.096	.133	44.96	197.0	133.5
2Q	.31	89.5	3.23	145.6	.096	.133	42.61	191.0	132.5
3Q	.33	94.9	3.34	150.6	.100	.137	44.66	199.4	138.1
4Q	.37	104.8	3.48	156.9	.106	.154	46.25	210.0	146.7
1951;	**.39**	**110.0**	**3.54**	**159.5**	**.120**	**.180**	**52.07**	**237.8**	**153.7**
1Q	.37	106.3	3.51	158.3	.116	.180	50.12	230.4	150.6
2Q	.39	111.4	3.48	156.9	.119	.170	51.45	234.0	152.4
3Q	.40	113.7	3.51	158.3	.122	.182	53.21	242.5	155.1
4Q	.38	108.5	3.65	164.6	.123	.187	53.51	244.3	156.7
1952;	**.40**	**114.2**	**3.80**	**171.3**	**.124**	**.186**	**54.50**	**247.8**	**162.5**
1Q	.40	112.8	3.71	158.3	.123	.184	52.97	242.5	159.3
2Q	.41	115.4	3.78	170.4	.122	.175	54.80	245.5	162.1
3Q	.41	117.9	3.74	168.6	.126	.195	56.55	255.4	163.6
4Q	.39	110.5	3.97	179.0	.126	.191	53.69	247.7	164.9
1953;	**.38**	**108.6**	**3.82**	**172.0**	**.122**	**.186**	**53.53**	**243.8**	**160.2**
1Q	.40	114.8	3.96	178.5	.121	.192	53.91	245.4	165.9
2Q	.39	112.0	3.73	168.2	.120	.180	51.67	237.1	158.5
3Q	.37	105.1	3.81	171.8	.123	.196	54.07	247.6	159.4
4Q	.36	102.3	3.76	169.5	.123	.175	54.48	245.0	156.9
1954;									
1Q	.36	101.4	3.63	163.7	.115	.174	52.00	233.9	152.0
2Q	.35	100.9	3.63	163.7	.115	.167	50.61	229.1	151.1

[1] Common excav. plus other excav. items expressed as equivalent common excav.
[2] Portland-cmt. concr. plus other surfacing expressed as equivalent portland-cmt. concr.
[3] Calculated to one more decimal place than shown in this table. [*] Fixed quantities used for establishing composite mile for price trend. [†] Prices used for establishing composite mile index bases.

• **Connecticut's** highway bid price index is a composite of five: structures, 33%; grading, drainage, 13%; trunk line, 26%; concrete pavement, 20%; town aid, 8%. One representative project was used for each category and this is repriced with bid prices prevailing on the dates or in the periods indicated, by the Highway Design Section, State Highway Department.

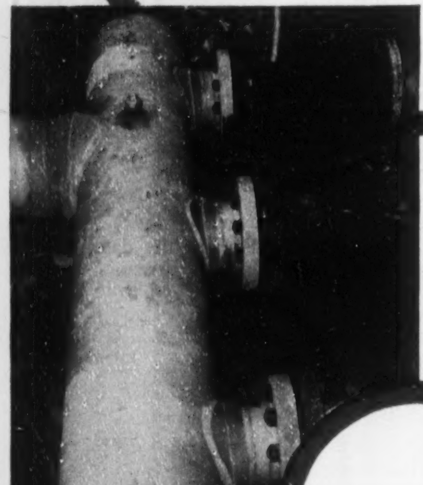
Date	Structures	Grading drainage	Trunk line	Concrete pavement	Town aid	Composite
1939	100.00	100.00	100.00	100.00	100.00	100.00
1940	93.76	94.19	92.78	98.54	86.41	93.93
1941	128.27	110.00	115.14	106.92	108.94	116.66
1942	139.83	130.00	156.21	129.89	142.75	141.06
1943	......	......	......	......	......	......
1944	......	......	......	......	......	......
1945	138.65	175.09	160.97	138.04	168.62	151.47
1946	163.34	177.27	192.20	132.95	207.09	170.08
1947	180.34	217.98	193.44	147.76	234.24	186.44
1948	228.17	231.36	198.27	198.31	190.28	211.81
1949	196.49	184.51	171.42	190.96	163.09	184.64
Jn '50	174.09	182.77	166.06	167.95	160.65	170.82
D '50	195.10	197.82	173.02	184.15	163.36	184.98
Jn '51	235.69	234.30	179.83	213.20	193.70	213.13
D '51	252.43	239.35	185.82	226.63	195.51	223.70
Jn '52	267.63	249.80	191.92	221.24	212.13	231.91
D '52	243.75	234.06	192.07	216.57	216.61	221.45
Jn '53	239.88	232.88	194.06	221.70	212.35	221.22
D '53	235.74	225.04	191.60	216.46	207.25	216.74
Jn '54	243.38	228.84	195.22	220.31	210.78	221.75

YES – 1954 is the year of sharp pencils



FOR REAL SAVINGS
IN WELDED BRANCH FITTINGS
SHARP PENCILS SPELL...

WELDOLETS



$700 was saved because Weldolets were used on the welded header shown at left. (Actual on-the-job photo.) Weldolets are available in all principal cities from selective warehousing distributors.

WELDING FITTINGS DIVISION
BONNEY FORGE & TOOL WORKS
376 GREEN ST., ALLENTOWN, PENNA.

Highway bid price indexes—1939-date

Reported by State Highway Departments to Engineering News-Record

State	Connecticut	Pennsylvania	Minnesota	Nebraska	Colorado	Mississippi	Arkansas	Texas	California		Oregon	Washington
Base year	1939	1940	1940	'37-'41	1949	'37-'41	1940	1949	'39-'40	1940	1940	1940
Type of index	% of type	weighted	composite mile	percentage	composite mile	% of type weighted	composite 10-mile	$100,000 project	weighted Bridge	weighted Highway	weighted	weighted
1939	100	...	....	97.5	....	101.26	...	....	...	....	....	.....
1940	93.9	100	100	93.2	....	100.36	100	....	99	100.0	100.0	100.0
'41	116.7	111	101.5	103.3	....	117.07	129	....	122	125.0	115.9	126.7
'42	141.1	138	145.1	171.4	....	158.79	181	....	158	157.5	156.8	174.5
'43	na	157	130.2	152.7	....	173.68	187	....	165	156.4	158.0	181.2
'44	na	133	131.8	157.0	....	196.10	199	....	153	177.8	166.4	177.7
'45	151.5	167	132.2	181.0	....	234.88	200	....	167	179.5	145.5	163.9
1946 Q 1	......	...	......	....	....	....	...	....	156	....	....	.....
2	......	...	......	....	....	....	...	....	190	....	....	.....
3	......	...	......	....	....	....	...	....	224	....	....	.....
4	......	...	......	....	....	....	...	....	217	....	....	.....
'46	**170.1**	**171**	**147.1**	**162.4**	....	**163.42**	**205**	....	...	**179.7**	**155.9**	**163.0**
1947 Q 1	......	...	......	....	....	....	...	....	224	....	....	.....
2	......	...	......	....	....	....	...	....	216	....	....	.....
3	......	...	......	....	....	....	...	....	219	....	....	.....
4	......	...	......	....	....	....	...	....	223	....	....	.....
'47	**186.4**	**201**	**169.0**	**188.6**	....	**187.91**	**241**	....	...	**203.3**	**186.1**	**194.6**
1948 Q 1	......	...	......	....	....	....	...	....	220	....	....	.....
2	......	...	H1 196.9	....	....	....	...	....	225	....	....	.....
3	......	...	......	....	....	....	...	....	238	....	....	.....
4	......	...	H2 193.7	....	....	....	...	....	231	....	....	.....
'48	**211.8**	**208**	**195.6**	**222.3**	....	**197.10**	**249**	....	...	**216.6**	**198.6**	**200.4**
1949 Q 1	......	...	......	....	....	....	...	103.2	207	....	....	.....
2	......	...	H1 166.3	....	....	....	...	99.0	210	....	....	H1 226.9
3	......	...	......	....	....	....	...	97.4	191	....	....	.....
4	......	...	na	....	....	....	...	98.2	187	....	....	H2 202.0
'49	**184.6**	**193**	**160.0**	**207.1**	**100**	**182.69**	**236**	**100.0**	...	**190.7**	**181.1**	.....
1950 Q 1	......	...	......	....	....	....	...	97.7	177	160.6	157.6	.....
2	H1 170.8	...	H1 147.5	....	....	....	...	100.6	195	180.0	162.2	H1 168.6
3	......	...	......	....	....	....	...	114.2	212	189.2	175.8	.....
4	H2 185.0	...	H2 154.0	....	....	....	...	119.8	218	194.8	187.4	H2 169.8
'50	......	**192**	**148.5**	**191.3**	**83.3**	**175.48**	**229**	**109.5**	...	....	....	.....
1951 Q 1	......	...	......	....	....	....	...	116.1	243	215.4	187.7	.....
2	H1 213.1	...	H1 180.5	....	....	....	...	121.0	250	238.3	193.6	H1 198.0
3	......	...	......	....	....	....	...	118.6	256	221.9	201.0	.....
4	H2 223.7	...	H2 197.8	....	....	....	...	110.1	253	245.4	196.6	H2 209.7
'51	......	**216**	**185.3**	**223.7**	**90.8**	**206.49**	**279**	**116.7**	...	....	....	.....
1952 Q 1	......	...	......	....	....	....	...	112.6	239	224.8	197.0	192.7
2	H1 231.9	...	H1 207.1	....	....	....	...	116.7	236	224.4	199.5	204.3
3	......	...	......	....	....	....	...	123.0	239	221.2	205.4	211.4
4	H2 221.5	...	H2 202.2	....	....	....	...	123.4	223	226.2	207.2	209.6
'52	......	**205**	**203.0**	**231.6**	**101.9**	**227.35**	**313**	**118.2**	...	....	....	.....
1953 Q 1	......	...	......	....	....	....	...	123.3	243	218.3	176.3	199.8
2	H1 221.2	...	H1 180.0	....	....	....	...	118.6	224	217.5	184.2	211.7
3	......	...	......	....	....	....	...	108.4	231	218.0	184.1	212.2
4	H2 216.7	...	H2 170.7	....	....	....	...	110.9	235	216.7	183.4	209.6
'53	......	**209**	......	**223.8**	**88.9**	**186.75**	**267**	**115.1**	...	....	....	.....
1954 Q 1	......	...	......	....	82.5	....	...	108.8	221	199.4	186.0	188.8
2	H1 221.8	...	H2 172.2	203.4p	78.7	....	...	111.0	217	189.0	....	189.9

p preliminary. H1, 1st half H2, 2nd half.

• **Arkansas** uses a composite 10-mi section and prices these quantities to get its highway price index: A. E. Johnson is Chief Engineer, State Highway Commission.

Item	Unit	Quantity	Wtd Aver '53 price
Clearing	acre	12,970	$132.44
Grubbing	acre	12,450	85.68
Excavation, solid rock, culv	cy	5,750	6.57
bridge	cy	96	14.41
common	cy	53,480	0.33
dry, for structures, road	cy	1,100	2.82
bridge	cy		3.82
wet, for structures, road	cy	384	4.82
bridge	cy		6.79
Embankment material	cy	20,290	0.332
Overhaul	stayd	134,590	0.02
Fence, moved & reconstructed	rod	1,175	1.41
Wells, reconstruct dug	lf	12	10.34
Buildings, moving Cl II	ea	2	115.63
Cl III	ea	1	337.50
Cl IV	ea	1	406.25
Cl V	ea	3	578.94
reconstr fdns & appurt Cl III	ea	1	287.50
Cl V	ea	3	120.45
Old culverts, remove	ea	2	35.28
Gravel, base course	cy	14,891	2.03
traffic surface	cy	12,205	2.56
Prime coat application	gal	14,678	0.148
Mineral aggregate, Cl 25 3-'53	cy	3,494	4.13
Cl 21	cy	442	6.50
Cut back asphalt, MC	gal	95,706	0.15
RC	gal	15,412	0.16
Pavement, PCC	sy	14,162	3.36
reinf steel, mesh	lb	62,455	0.084
bars	lb	3,802	0.117
Concrete, bridge Cl A	cy	885.00	52.24
" Cl B	cy	40.08	52.24
" Cl S	cy	358.00	49.11
reinf steel	lb	94,326	0.119
Piling, conc	lf	1,776	8.41#
Railing, conc	lf	474	4.60*
Steel, struct beam spans	lb	112,700	0.149
truss spans	lb	576,500	0.20
Metal bearing & rdwy expan devices	lb	28,600	0.40*
Timber, bridge treated	Mfbm	45.784	400.00*
untreated	Mfbm	28.472	279.00*
Piling, timber treated	lf	3,912	3.25*
untreated	lf	3,500	2.56
Concrete Cl A	cy	295.40	47.42
Cl B	cy	39.17	50.00*
reinf steel	lb	33,971	0.124
Culvert, RCCP 18"	lf	135	3.38
24"	lf	444	4.52
30"	lf	114	6.46
relaying	lf	99	2.44
Riprap	cy	206	10.01

*estimated # 16" octagonal

• **Colorado** uses all major items in its highway system in the 5-year period 1949 through 1953 divided by 5 as the basis for its composite mile. R. E. Livingston is Planning & Research Engineer, Department of Highways. After screening all bid items that accounted for less than 1% of the total cost, the resulting items account for 90% for the total construction each year and these are repriced with bid prices prevailing for the dates shown to obtain the highway bid price index:

Item	Unit	Quantity	Unit Price					
			1949	1950	1951	1952	1953	2nd Q 1954
Excavation, unclass	cy	10,630	$0.441	$0.278	$0.338	$0.374	$0.290	$0.226
struct.	cy	109	3.376	2.496	3.113	3.983	2.645	2.535
Backfill, struct	cy	116	1.948	1.559	1.929	1.888	1.654	1.904
Rolling	hr	88	7.470	8.187	8.089	9.174	8.973	8.499
Wetting	Mgal	351	1.382	1.097	1.407	1.261	1.095	1.129
Overhaul	stay	64,112	0.014	0.009	0.010	0.012	0.009	0.008
	ydmi	6,055	0.122	0.084	0.107	0.110	0.097	0.088
	tnmi	12,188	0.091	0.071	0.079	0.111	0.082	0.075
Sub-base	t	2,998*	0.521	0.482	0.566	0.589	0.542	0.323
Gravel, cr rock surf	t	1,976	0.894	0.790	0.974	1.094	0.939	0.624
Asphalt	t	17	37.500	26.557	32.154	36.928	27.868	22.617
liquid	gal	10,252	0.151	0.135	0.153	0.162	0.152	0.143
Road mix process	sy	4,659	0.097	0.074	0.089	0.090	0.089	0.076
Stone screenings	t	70	3.727	3.926	5.755	6.299	5.809	5.562
Asph surf, plant mix	t	279	4.500	3.142	4.103	4.624	3.434	2.950
Concrete pavement	sy	449	3.512	4.235	2.800	3.473	3.432	2.910†
Bridge timber	Mfbm	1	236.378	284.855	325.395	309.120	268.521	244.445
Concrete	cy	36	48.564	44.611	51.007	53.777	53.539	51.839
Steel, reinf	lb	4,107	0.115	0.100	0.072	0.067	0.083	0.113
struct	lb	7,114	0.133	0.126	0.051	0.114	0.095	0.141
Culvert, RCCP	lf	16#	8.263	6.992	18.059	7.078	6.392	11.755
CMP	lf	109#	5.823	5.551	6.924	7.335	7.501	6.582
Fence, barbed wire	lf	1,286	0.220	0.211	0.235	0.239	0.232	0.310
Sewer pipe	lf	17#	7.504	6.281	10.440	5.898	6.655	8.344†

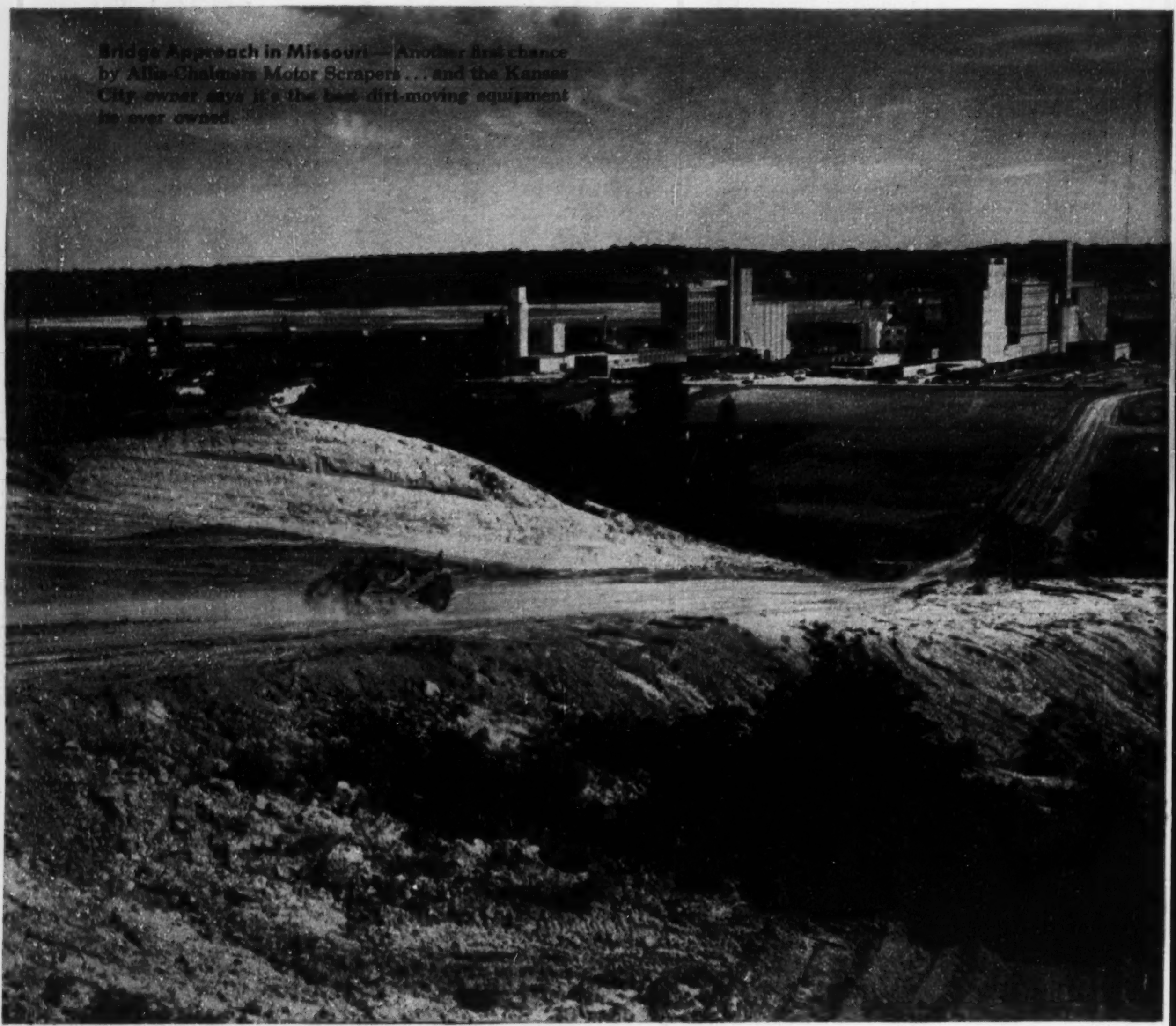
* incl all matl whether bid as sub-base or select borrow # incl all diam priced at average of all pipe used † estimated

• **Nebraska** uses a weighted average of eight classes of highway construction based on average quantities in 1937-41 in the proportions in which they were then used. John W. Hossack is Engineer, Program and Planning for the Department of Roads and Irrigation. This bid price index is available back to 1917-18.

Item	Weight %	Index			
		Year	Value	Year	Value
Grading: excavation	18	'17-'18	240.3	1931	113.6
culvert concrete	5	'19-'20	274.7	1932	97.4
CMP	2	'21-'22	251.7	1933	109.3
Surfacing: gravel	20	'23-'24	185.6	1934	107.1
concrete pavement	15	'25-'26	165.8	1935	111.5
oil	15	'27-'28	156.3	1936	113.6
Structures: bridge concrete	9	'29-'30	147.3	1937	106.2
structural steel	16	......	.....	1938	99.1

• **Minnesota** uses a composite mile based on 1948 quantities for the eight items shown in the accompanying table. All items that may require it are corrected for design changes, differences in haul distances and other varying factors. A Minnesota trend to higher standards came with the downtrend in cost. O. L. Kipp is Assistant Commissioner and Chief Engineer. Minnesota composite mile base quantities—1948—are:

Excavation, cl C	36,085 cy	Concrete, structural	89 cy
Concrete pavement	3,787 sy	Crusher run bases	4,082 t
Reinforcement	11,309 lb	Bituminous surface, road mix	173 t
Steel, structural	8,708 lb	plant mix	460 t



Bridge Approach in Missouri—Another first chance by Allis-Chalmers Motor Scrapers . . . and the Kansas City owner says it's the best dirt-moving equipment he ever owned.

Today's Contractors are Keen Judges of Equipment

On earth-moving jobs all over the country, design, performance and service features that were once taken for granted are now getting a careful look . . . because even one extra yard per load, one extra mph. on the haul road can make a big difference when it comes to staying within bidding estimates.

That's why you see Allis-Chalmers Motor Scrapers and Motor Wagons on more and more big construction projects like those illustrated here. Cost-conscious, profit-conscious contractors have analyzed them, used them and have satisfied themselves that Allis-Chalmers Motor Scrapers have what they need to help them win bids, stay on schedule and make a profit when they are through with the job.

If you have your sights set on some close-margin, hard-to-get business, we *know* it will pay you to go over *all* the facts with your nearby Allis-Chalmers dealer.

Housing Project in California — Here, six big TS-300's and their HD-20 partners team up at the Westlake job near San Francisco . . . for a contractor moving over 8,000,000 yards in the last five years.

Runway Extension in Tennessee — This TS-300 is the first Allis-Chalmers equipment this contractor has ever owned, but it earned a regular spot fast by high-balling capacity loads like this trip after trip.

Dam-Building in Illinois — and the fleet color is Persian Orange. The 176 hp. TS-200's and HD-20's load smoothly, efficiently . . . and the TS-200 is rolling fast toward the fill the instant they break contact.

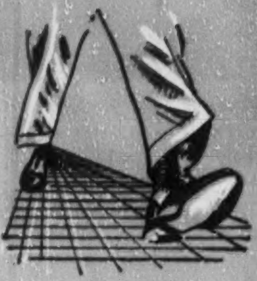
Railroad Bed in Montana — These TS-300's (14-yd. struck capacity; 18-yd. heaped capacity) averaged 14 trips an hour, excavating grade for a five-track rail bed at the site of a new aluminum plant.

Jet Base in Jersey — Silt and sand make this a tough job . . . but the extra power of the TS-300's, plus the HD-20's ability to exert full power at creep speeds, paid off in big yardage.

ALLIS-CHALMERS

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

WHERE SAFE WALKWAYS COUNT...



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In appearance, design, construction—Gary Welded Grating is outstanding for all open steel flooring and stair tread installations. One piece construction, with main bearing bars and *hexagonal cross bars*, resistance-welded means stronger, longer lasting flooring. Tops of all bars are flush and it is self-cleaning, providing the utmost in safety. Main bars on 1$\frac{3}{16}$″ centers and cross bars on 4″ centers, in panels 36″ wide and lengths to 40′0″. Also available in a variety of special types with spacing of bars to suit your requirements. Gary Welded is tailor-made, factory-fabricated to your specifications—a big saving for you in installation time and expense. For illustrations of Gary Grating and Stair Treads in use and complete description of all Gary products, send for Catalog E-104.

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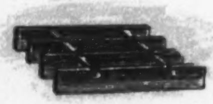

FREE SAMPLE

Write us on your company stationery. We'll send handy paper weight size sample.

• **Mississippi** bases its highway price index on 18 price series combined into six sub-index groups under direction of E. M. Johnson, Chief Engineer of the State Highway Department.

Average unit prices for 1937 through 1941 and quantity weights based on the 1938 and 1947 totals as 100 are used to establish the 100 base for each of the sub-index series as well as for the composite index. These are actuated by the prices below.

In the accompanying table the average unit prices are shown instead of the indexes based on them. The influence each price series exerts on its sub-index is shown, also the influence each sub-index has on the composite index. These are shown as %s in the captions for each series.

	Average unit prices								
	Sub-index A 34.8%		B 8.2%	Sub-index C 20.2%				Sub-index D 9.8%	
	Grading		Drainage	Cement concrete pavement				Bit pavement	
SI Wgt Year	Exc, uncl ᵃ 64.1% cy	Topping ᵃ 35.9% cy	B conc culv ᵇ 100% cy	Plain cmt 0.3% sy	7-5-7" RCC 34.8% sy	8-6-8" RCC 1.6% sy	9-6-9" RCC 63.3% sy	Asph, prime 50.3% gal	Cover mtls 49.7% cy
1922......	$0.284	$....	$17.05	$1.53	$2.55	$2.74	$2.78	$....	$....
1923......	0.285	0.71	22.79	2.27	2.17	2.80	2.26	....	....
1924......	0.290	0.50	23.26	2.18	2.18	2.85	2.20	....	....
1925......	0.303	....	24.69	2.09	2.06	2.42	2.34	....	....
1926......	0.306	....	24.68	1.99	1.94	2.28	2.21	....	....
1927......	0.325	....	22.41	1.90	1.83	2.15	2.08	....	....
1928......	0.287	....	22.21	1.76	1.67	1.96	1.90	....	....
1929......	0.256	....	20.53	1.63	1.54	1.81	1.75	....	....
1930......	0.247	0.95	21.51	1.50	1.40	1.64	1.59	....	....
1931......	0.228	1.42	16.48	1.56	1.37	1.61	1.56	....	....
1932......	0.195	0.26	13.74	1.52	1.26	1.48	1.43	....	....
1933......	0.245	0.35	17.62	1.48	1.58	1.78	1.64	0.12	....
1934......	0.280	0.41	19.64	1.45	1.69	1.88	1.71	0.13	2.67
1935......	0.280	0.33	21.37	1.65	1.36	1.85	2.02	0.14	6.10
1936......	0.264	0.29	21.40	1.49	1.53	1.79	1.71	0.15	....
1937......	0.257	0.27	20.55	1.90	1.505	1.76	1.68	0.128	....
1938......	0.211	0.34	19.92	1.67	1.39	1.59	1.48	0.10	5.15
1939......	0.242	0.35	19.51	1.50	1.49	1.72	1.63	0.095	4.31
1940......	0.212	0.42	20.48	1.34	1.51	1.76	1.68	0.094	4.55
1941......	0.250	0.42	25.61	1.71	2.20	2.58	2.50	0.072	....
1942......	0.398	0.41	32.60	2.62	2.32	2.73	2.65	0.17	....
1943......	0.267	1.26	27.98	3.25	2.44	2.88	2.81	0.179	6.00
1944......	0.567	1.07	32.58	2.44	2.55	3.04	2.97	0.125	5.50
1945......	0.671	1.21	38.66	2.58	2.95	3.47	3.36	....	....
1946......	0.311	0.62	42.46	2.72	2.28	2.38	2.49	0.11	5.25
1947......	0.345	0.72	47.80	3.96	2.26	3.00	3.17	0.130	6.55
1948......	0.325	0.79	48.41	3.80	2.78	2.82	2.95	0.17	7.03
1949......	0.312	0.71	45.852	3.64	2.99	3.269	3.291	0.155	7.076
1950......	0.260	0.797	42.16	3.50	2.78	4.00	2.57	0.165	6.72
1951 ᶜ......	0.320	0.78	52.87	....	3.90	....	3.39	0.17	6.77
1952......	0.410	0.82	50.43	....	3.83 ᵈ	....	....	0.17	6.85
1953......	0.286	0.73	50.58	....	3.25 ᵈ	....	2.74 ᵉ	0.156	6.16
Base prices '37-41.....	0.235	0.346	20.53	1.64	1.48	none	1.60	0.094	4.56

*a incl haul *b incl D conc *c first half of yr only *d convrtd from 8" uniform

	Average Unit Prices								
	Sub-index E 4.1%		Sub-index F 23.1%						
	Gravel		Structures						
SI Wgt Year	Surf course 32.1% cy	Stab aggr 67.9% cy	Conc, B&C brl 44.9% cy	Reinf stl, brl 12.4% lb	Str stl 27.1% lb	Timber, treated 1.5% Mbm	Piling, timb ᶠ tr 6.6% lf	Piling stl 7.5% lf	Composite index
1922......	$2.86	$....	$18.95	$0.05	$0.04	$87.23	$1.02	$....	116.99
1923......	2.41	....	24.82	0.06	0.086	102.77	1.10	....	138.51
1924......	2.10	....	29.55	0.05	0.09	95.57	1.05	....	131.90
1925......	3.08	....	26.34	0.06	0.078	91.69	1.12	....	131.44
1926......	2.95	....	30.65	0.05	0.066	111.68	1.02	....	130.69
1927......	2.86	....	22.69	0.049	0.065	92.03	0.95	....	128.48
1928......	2.59	....	22.04	0.044	0.056	82.33	0.85	....	114.33
1929......	3.13	....	21.71	0.042	0.045	75.86	0.805	....	105.86
1930......	2.50	....	20.41	0.04	0.0425	73.47	0.68	....	122.91
1931......	....	....	19.10	0.037	0.047	77.11	0.724	....	137.13
1932......	2.44	....	16.87	0.029	0.036	61.00	0.67	....	80.39
1933......	1.85	3.00	17.73	0.032	0.037	87.32	0.85	....	100.10
1934......	2.32	2.57	20.82	0.036	0.042	116.97	0.89	....	106.38
1935......	1.73	2.63	22.43	0.045	0.046	99.21	0.89	....	112.64
1936......	2.00	2.61	24.16	0.043	0.049	113.93	0.99	....	106.99
1937......	1.89	1.25	22.00	0.046	0.051	116.07	1.05	....	102.74
1938......	1.98	1.57	22.45	0.04	0.05	114.08	1.04	1.81	95.80
1939......	2.02	2.17	23.54	0.042	0.051	122.00	1.07	1.76	101.26
1940......	2.18	1.56	23.36	0.04	0.05	124.88	1.04	....	100.36
1941......	1.91	0.81	27.98	0.05	0.06	139.30	1.25	....	117.07
1942......	3.00	....	34.27	0.067	0.09	249.73	1.88	....	158.79
1943......	....	....	30.35	0.06	0.094	176.00	1.54	....	173.68
1944......	2.43	....	33.17	0.143	0.098	200.00	2.29	....	196.10
1945......	1.00	....	60.00	0.09	0.10	205.55	2.31	....	234.88
1946......	2.85	4.25	41.22	0.07	0.085	211.11	2.34	3.21	163.42
1947......	2.55	4.43	49.96	0.09	0.112	237.50	2.37	3.93	187.91
1948......	3.08	4.41	54.66	0.11	0.127	276.04	2.63	3.71	197.10
1949......	2.337	2.218	46.534	0.102	0.114	232.91	2.133	2.735	182.69
1950......	2.385	3.86	43.945	0.098	0.119	222.12	1.98	3.319	175.48
1951*......	2.70	3.74	55.07	0.123	0.144	275.26	2.27	4.10	206.49
1952......	2.13	3.99	59.00	0.123	0.156	277.78	2.25	5.44	227.35
1953......	2.94	4.09	48.80	0.11	0.134	253.31	1.90	3.98	186.75
Base prices '37-41.....	1.98	1.67	23.04	0.043	0.052	121.27	1.19	1.80	100.0

*e convrtd from 8" uniform *f creo *SI sub index

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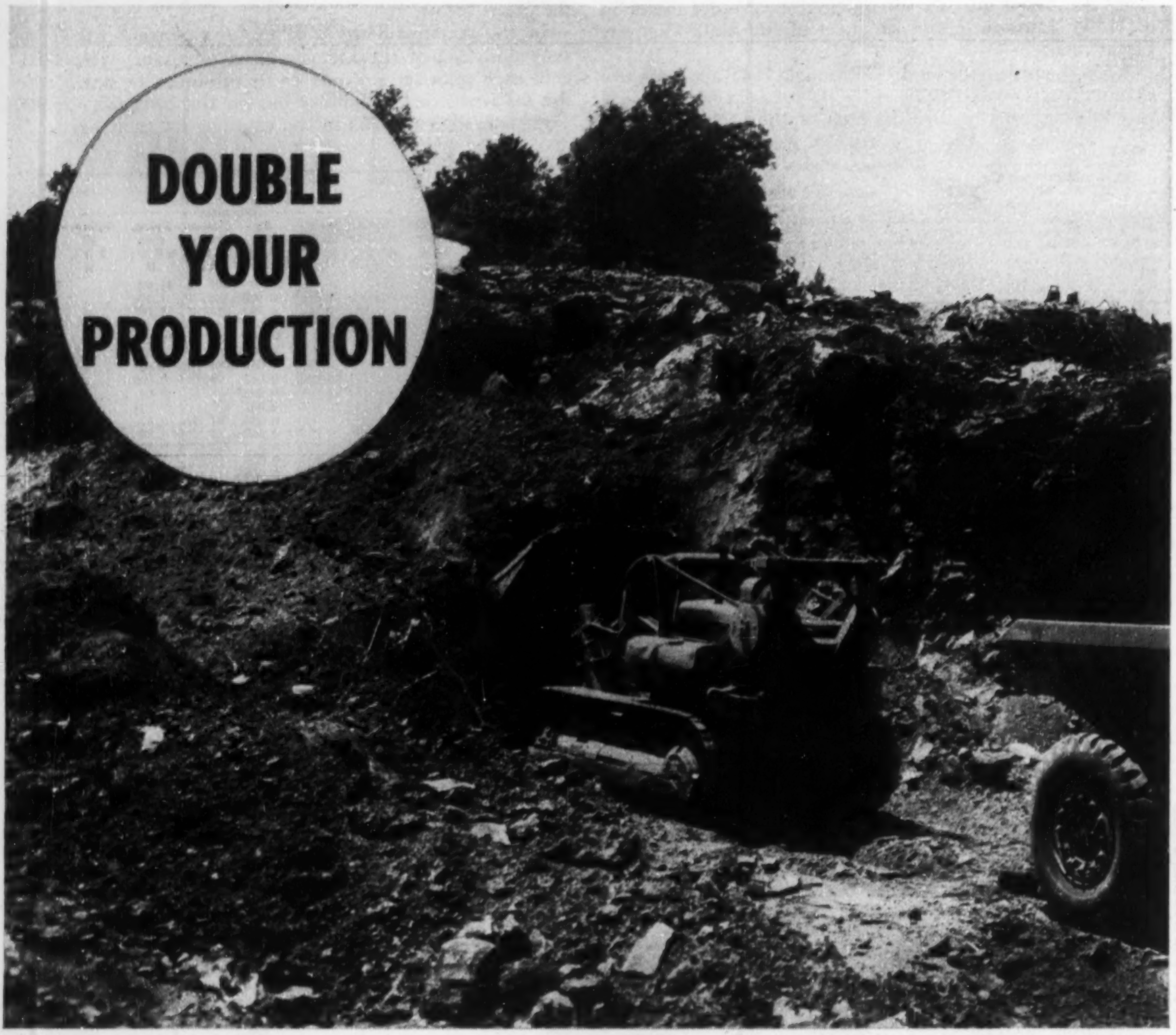

Digging in heavy rough rock, conglomerate, unbroken sedimentary material or clay is hard on equipment doing the excavating. To stand up under this work day in and day out, the excavating equipment must be specially designed.

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B-70

You Can't Beat An Eimco!

• **Texas** reprices a 1949 project valued at $100,000 to obtain its highway bid price index. Using state-wide weighted averages, monthly, quarterly and annual values are computed. In addition a 12-month moving average is calculated and plotted quarterly by the Petit method (ENR—9-4-52 and 10-8-53) to measure the momentum of highway price trends. Annually a corresponding price index is computed for each of the 29 Texas highway divisions.

These eleven items repriced accounted for 71.8% of the construction total in 1949, 76.8% in 1950, 75.9% in 1951 and 80.3% in 1952:

Examples for 1949 and 1952 show how unit prices vary between divisions and from the state average.

Jed N. Robinson is construction engineer for the Texas Highway Department and the cost trend specialist.

Item, base project	Unit	Quantity	1949 bid price high div	1949 bid price wtd st aver	1949 bid price low div	1952 bid price high div	1952 bid price wtd st aver	1952 bid price low div
Excavation, roadway	cy	39,934	$0.8000	$0.3034	$0.2265	$1.2875	$0.4234	$0.2592
Sprinkling	Mgal	2,439	1.4939	1.1229	0.7507	2.8920	1.3569	0.5471
Rolling	hr	729	4.9385	4.0042	3.5004	6.2399	4.2489	3.0914
Flexible base	cy	19,007	2.2521	1.1281	0.6395	5.4086	1.3851	0.9609
Asphalt	gal	49,737	0.1669	0.1333	0.1098	0.2063	0.1392	0.1081
Aggregate	cy	891	6.2158	5.2540	4.6047	7.9883	5.7848	4.5140
Concrete pavement	cy	1,003	19.7589	13.6468	10.7220	40.1695	14.4759	12.4376
Bituminous mixtures	t	1,232	8.2000	5.6596	4.8863	9.7339	6.2478	4.3999
Cl A concrete	cy	395	47.3307	37.6150	28.3788	60.2643	42.2981	20.0936
Steel, reinforcing	lb	67,069	0.1126	0.0911	0.0850	0.1328	0.1085	0.0979
structural	lb	66,250	0.1469	0.1200	0.0900	0.3306	0.1474	0.1249

• **California's** highway construction price index is based on average contract prices for the eight principal classes of construction shown in the accompanying table. The index is weighted each year according to the actual quantities of each of these contract items. The base is 1940 = 100, 1940 quantities multiplied by 1940 average contract prices. The price index for each period is computed by extending total quantities. Richard H. Wilson, Assistant state highway enginner, H. C. McCarty, Office engineer.

Highway average prices, Division of Highways—1940=100

Year	Rdwy excavt per c y	Crush run base per ton	Plant mix surf per ton	Asph conc pave per ton	PCC pavement per c y	PCC structures per c y	Bar reinf steel per lb	Structural steel per lb	Hwy const price index	Bridge const price index
1940	$0.22	$1.54	$2.19	$2.97	$7.68	$18.33	$0.040	$0.083	100.0	99
1941	0.26	2.31	2.84	3.18	7.54	23.31	0.053	0.107	125.0	122
1946	0.41	2.45	4.00	4.68	9.48	37.38	0.060	0.099	179.7	197†
1948	0.55	2.43	4.30	5.38	13.04	49.86	0.092	0.126	216.6	229†
1949	0.49	2.67	4.67	4.64	12.28	48.67	0.096	0.117	190.7	199†
'50 Q 1	0.34	2.22	3.65	3.74	.....	40.15	0.077	0.081	160.6	177
2	0.40	2.13	4.48	3.74	10.86	43.03	0.080	0.105	180.0	195
3	0.41	2.32	4.25	5.50	10.91	44.34	0.093	0.131	189.2	212
4	0.42	2.81	4.64	4.61	12.55	43.18	0.098	0.120	194.8	218
'51 Q 1	0.45	3.07	4.06	5.22	11.71	46.38	0.103	0.206	215.4	243
2	0.63	3.88	4.56	4.63	12.93	51.50	0.105	0.166	238.3	250
3	0.56	2.88	4.59	3.90	12.41	46.14	0.107	0.165	221.9	256
4	0.66	2.91	5.66	4.89	12.71	49.38	0.105	0.169	245.4	253
'52 Q 1	0.56	3.25	4.88	4.77	14.25	47.46	0.094	0.152	224.8	239
2	0.53	3.19	5.29	4.13	14.20	49.12	0.091	0.143	224.4	236
3	0.55	2.61	5.49	4.60	12.80	48.21	0.094	0.132	221.2	239
4	0.66	2.68	4.97	.....	12.53	48.45	0.094	0.128	226.2	223
'53 Q 1	0.45	2.48*	5.27	4.46	12.47	53.19	0.098	0.150	218.3	243
2	0.50	2.07	5.38	4.59	13.06	52.68	0.091	0.132	217.5	224
3	0.54	2.15	5.30	4.82	13.78	49.23	0.092	0.129	218.0	231
4	0.48	2.11	4.74	4.47	14.77	53.41	0.105	0.139	216.7	235
54 Q 1	0.45	2.28	4.23	4.78	14.89	47.52	0.092	0.126	199.4	221
2	0.38	2.09	4.29	5.18	14.28	47.12	0.093	0.114	189.0	217

† average of quarterly values * untrtd rock base substituted for crusher run at this point

The bridge price index is based on these items, quantities and weighted average 1939-40 prices:

Items	Quantities	1939-40 prices	Items	Quantities	1939-40 prices
Structure excavation..cy	156,286	$1.560	Misc iron and steel...lb	766,630	$0.138
Cl "A" portl cmt concr,			Bar reinf steel........lb	35,958,000	0.040
structure..........cy	176,634	18.420	Furn steel piling......lf	79,329	1.790
footing block.......cy	12,774	12.040	Furn concr piling......lf	146,861	1.600
Struct steel,			Driving steel piling...ea	2,313	25.290
plate girder........lb	5,810,000	0.077	Driving concr piling..ea	3,781	40.840
rolled beam........lb	4,953,000	0.063	Steel bridge railing....lf	21,709	5.930
truss...............lb	7;884,000	0.099	Concr bridge railing...lf	42,976	1.910

• **Oregon** weights six items for its composite highway bid price index according to the amounts of these items awarded during the base year, 1940. These have been repriced quarterly since 1949 with average bid prices, annually 1940 through 1949. R. H. Baldock is State Highway Engineer.

Indexes for the six components of the Oregon index are:

Year	Grading	Cr rock surface	Bit mac surface	Asph conc pavement	Port cmt conc pave	Conc bridge & structs	Composite index
1940	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1941	108.2	127.7	117.7	112.2	120.2	115.2	115.9
1942	181.2	187.5	125.9	141.1	164.5	160.3	156.8
1943	164.7	175.9	167.5	146.2	208.8	156.5	158.0
1944	202.4	199.2	147.3	125.3	166.4	184.1	166.4
1945	159.2	163.9	139.4	118.3	141.1	199.3	145.5
1946	171.0	175.1	147.8	116.6	155.0	205.5	155.9
1947	211.2	183.5	160.5	118.3	215.2	247.1	185.1
1948	218.1	193.9	174.7	151.6	235.8	272.2	198.6
1949	181.0	169.6	173.4	145.6	231.1	250.0	181.1
'50 Q 1	133.9	150.6	156.1	115.7	227.8	243.1	157.8
Q 2	132.8	174.9	158.5	127.1	227.8	210.0	162.2
Q 3	154.6	177.8	174.6	136.9	228.8	241.3	175.8
Q 4	155.7	190.8	185.7	135.9	227.8	276.4	187.4
'51 Q 1	190.8	180.9	184.5	124.5	227.8	269.0	187.7
Q 2	174.5	192.8	192.2	130.1	227.8	289.1	193.6
Q 3	186.8	213.7	210.8	123.9	240.5	265.9	201.0
Q 4	210.0	191.6	190.9	130.5	243.6	277.2	198.6
'52 Q 1	197.8	198.1	187.0	127.3	243.6	278.5	197.0
Q 2	191.1	210.4	177.3	135.3	243.6	280.0	199.5
Q 3	201.8	218.8	187.7	131.9	243.6	301.1	205.4
Q 4	202.9	219.3	188.8	137.3	243.6	282.7	207.2
'53 Q 1	187.4	160.6	186.3	115.5	221.5	247.6	178.3
Q 2	170.8	179.1	181.9	119.9	236.1	281.4	184.2
Q 3	173.4	184.7	184.9	116.3	234.2	266.9	184.1
Q 4	162.0	191.0	179.7	113.7	237.3	271.7	183.4
'54 Q 1	163.5	191.2	182.3	121.1	239.2	275.9	186.0

• **Washington** highway price index is based on 1946-49 average quantities and 1940 average unit prices. To get a current index, multiply base quantities by current average unit prices. R. H. Kenyon is Engineer, Plans & Contracts for the Department of Highways.

Items		Base quantities	Average Unit Prices '40	'41	'42	'43	'44	'45	'46	'47	'48
Exc, common	cy	2,068,000	0.164	0.191	0.317	0.353	0.508	0.259	0.259	0.328	0.345
uncl	cy	2,386,000	0.209	0.295	0.375	0.475	0.416	0.403	0.383	0.466	0.364
struct rock	cy	513,000	0.506	0.885	1.813	1.080	0.700	0.917	0.905	1.157	1.159
Ballast	t	516,150	0.398*	0.583*	0.674*	1.003*	1.105*	0.952*	0.818*	1.027*	1.330
Cr stone surf											
base	t	199,800	0.792*	0.951*	1.575*	1.534*	1.202*	1.547*	1.354*	1.282*	1.482
top	t	336,050	0.806*	0.938*	1.113*	1.358*	1.471*	1.399*	1.525*	1.445*	1.521
Asph conc l-1	t	99,000	6.141	7.352	7.064	9.164	7.167	6.587	6.438	6.879	6.508
Cmt conc pvmt, 8"	sy	82,000	1.800	2.237	2.461	2.173	2.550	2.894	2.572	4.469	4.073
Conc cl A, bri	cy	14,000	24.481	31.387	45.000	39.874	34.080	40.983	47.196	55.824	60.553
Reinf steel,											
bri & culv	lb	4,278,000	0.051	0.053	0.097	0.059	0.064	0.064	0.070	0.091	0.110
Struct steel	lb	4,000,000	0.078	0.080	0.100	0.113	0.146	0.133	0.138	0.166	0.192

* convertd from cy to t

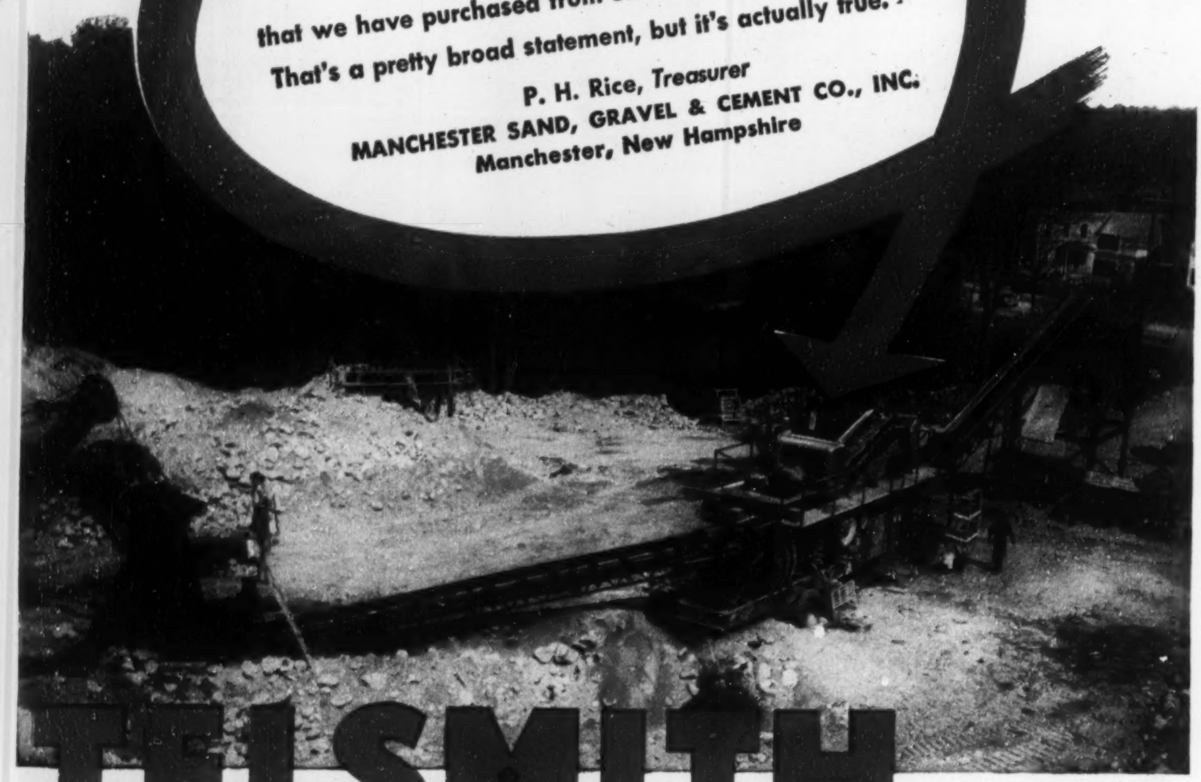
Items	Unit	Average unit prices '49	'50	'51	'52	'53	Index Year	Value	Year	Value
Exc, common	cy	0.305	0.268	0.332	0.276	0.278	1940	100.0	'51H1	198.0
uncl	cy	0.442	0.253	0.341	0.451	0.452	1941	126.7	2	209.7
struct rock	cy	1.030	0.935	1.178	1.309	1.433	1942	174.5	'52Q1	192.7
Ballast	t	1.188	1.002	1.235	1.219	1.248	1943	181.2	2	204.3
Cr stone surf							1944	177.7	3	211.4
base	t	1.815	1.418	1.550	1.440	1.417	1945	163.9	4	209.6
top	t	1.687	1.537	1.714	1.608	1.590	1946	163.0	'53Q1	199.8
Asph conc l-1	t	7.798	6.469	8.290	6.796	6.558	1947	194.6	2	211.7
Cmt conc pvmt, 8"	sy	3.048	2.731	3.392	3.289	3.366	1948	200.4	3	212.2
Conc cl A bri	cy	57.248	59.587	65.731	62.184	66.774	'49H1	226.9	4	209.6
Reinf steel							'49 2	202.0	'54Q1	188.8
bri & culv	lb	0.102	0.097	0.114	0.110	0.107	'50H1	168.6	Q2	189.9
Struct steel	lb	0.193	0.160	0.229	0.246	0.218	'50 2	169.8	Q3	.....

These highway price indexes are based on the classes of work that occur most frequently on highway construction. For an idea of the vast range and variety of cost and price knowledge needed see the article in this issue "Where the highway dollar goes" following the unit prices. Additional data on costs per mile and prices in other states will be published December 30.

Indexes for 11 states are reported on their original bases in the table on page 117. For the graphs in the folded insert, indexes for 9 states have been converted to a uniform 1949 = 100 base. Of the 11 indexes in the table, 8 reached their highest points in 1952. Exceptions are Pennsylvania, 1951; California, 4th quarter, 1951; and Washington, mid-'53.

"The Telsmith portable plant is working out fine. It is most satisfactory in every respect; just like every piece of equipment that we have purchased from Smith Engineering Works. That's a pretty broad statement, but it's actually true."

P. H. Rice, *Treasurer*
MANCHESTER SAND, GRAVEL & CEMENT CO., INC.
Manchester, New Hampshire



TELSMITH PORTABLE PLANTS

Along the new Frederick E. Everett Highway... Manchester Sand, Gravel & Cement Co., Inc. is producing minus 1½″ crushed bank gravel (50% to be retained on ¼″ screen) for 2½ miles of this 40-mile central New Hampshire turnpike. Material was used as a crushed gravel base course. The crushing plant—a 9-C Telsmith Dual Portable—produces about 125 cu. yds. per hour.

"In a normal pit I would expect about 150 yds. per hour," says Mr. P. H. Rice, "but this deposit is most unusual ... we were crushing about 60% of the material. Several parts of the pit seemed to have about 80% stone."

Telsmith Portable Crushing and Screening Plants are noted for their greater capacity and dependable, low-cost operation.

The Telsmith Portable shown is a ***9-C Dual*** with 10″ x 36″ jaw crusher, 30″ x 18″ rolls and 4′ x 10′ 2½-deck screen. Made in other popular sizes. Get Bulletin 276.

P-19

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

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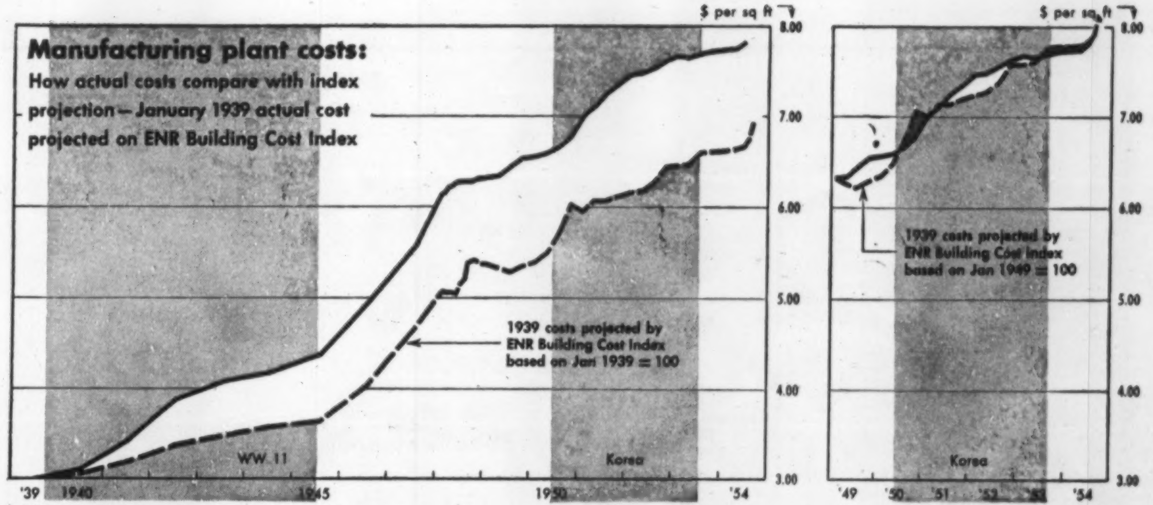


Walter Kidde Constructors, New York, N. Y.

Manufacturing plant cost index—1939 = $3/sq ft

This special purpose cost index is based on the unit "actual cost," $3 per sf in 1939, of an average standard manufacturing plant. Every plant built has its own characteristics which affect its cost, thus cost estimates or accounts for different plants do not measure accurately the direction and degree of cost and price movements.

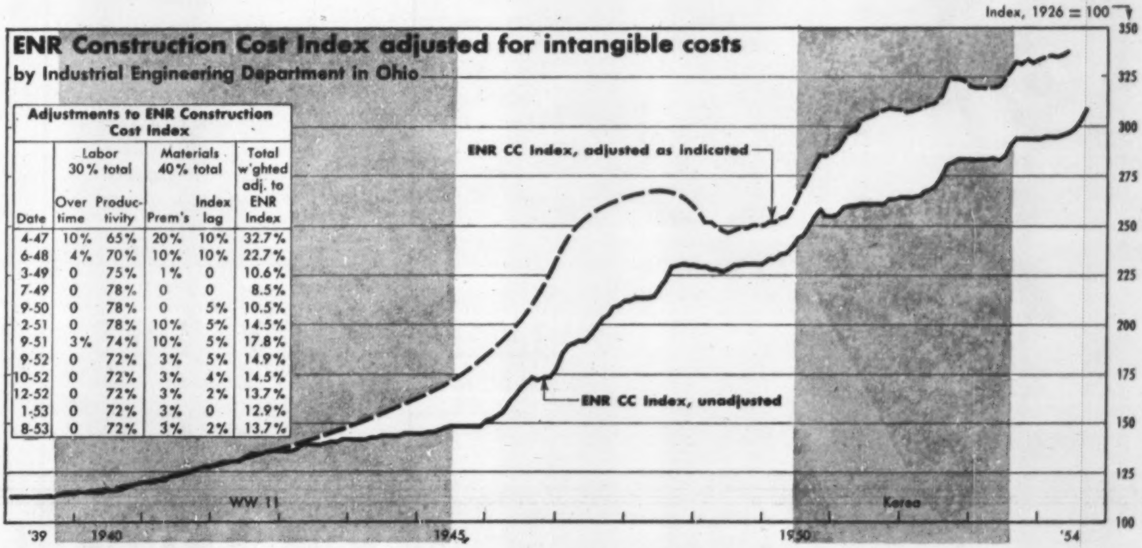
So the same plant is repriced here to represent experience in the metropolitan New York and New Jersey areas. Costs include overhead, insurance, taxes, overtime, construction equipment use and other "invisible" costs that must be covered in the selling price. Holding these to a minimum, plus shrewd buying and good labor relations and direction are the functions of management and the measure of productivity.

To test the effects of these "invisibles" on actual costs, the 1939 base price has been projected by use of the ENGINEERING NEWS-RECORD Building Cost Index which measures only the trend in cost of labor and materials.

Note from the chart above at the left how much faster the actual costs went up after the war when productivity was low because of material shortages and unreliable delivery schedules and when new teams of workers had to be built up, almost from scratch.

But note also in the chart at the right how improved productivity is pulling the actual costs across and below the curve that measures the movement in materials prices and wage rates including fringe benefits. The highly competitive situation in 1954 should hold this actual cost curve below the building cost index projection.

This "actual vs. theoretical" cost comparison is made available by E. Warren Bowden, vice president, Walter Kidde Constructors, Inc., New York.

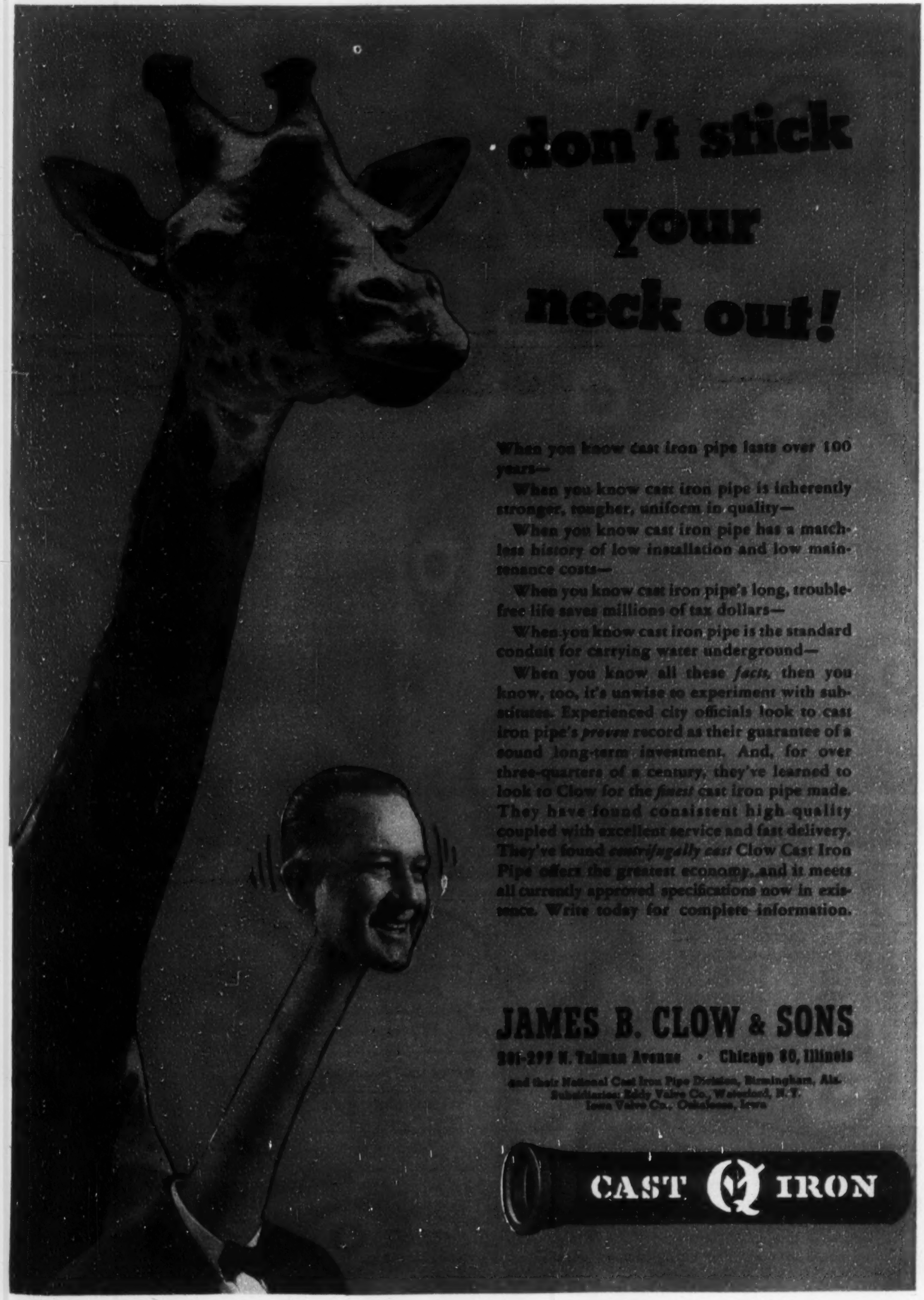


Adjustments to ENR Construction Cost Index

Date	Labor 30% total		Materials 40% total		Total w'ghted adj. to ENR Index
	Over time	Productivity	Prem's	Index lag	
4-47	10%	65%	20%	10%	32.7%
6-48	4%	70%	10%	10%	22.7%
3-49	0	75%	1%	0	10.6%
7-49	0	78%	0	0	8.5%
9-50	0	78%	0	5%	10.5%
2-51	0	78%	10%	5%	14.5%
9-51	3%	74%	10%	5%	17.8%
9-52	0	72%	3%	5%	14.9%
10-52	0	72%	3%	4%	14.5%
12-52	0	72%	3%	2%	13.7%
1-53	0	72%	3%	0	12.9%
8-53	0	72%	3%	2%	13.7%

Example of an addition to general purpose index to serve a special purpose

To adapt a basic general purpose cost index to its needs, a big industrial company in Ohio superimposes on the ENGINEERING NEWS-RECORD Construction Cost Index an additional component to cover the "invisible" or "intangible" costs described above. The method used is shown in the accompanying chart.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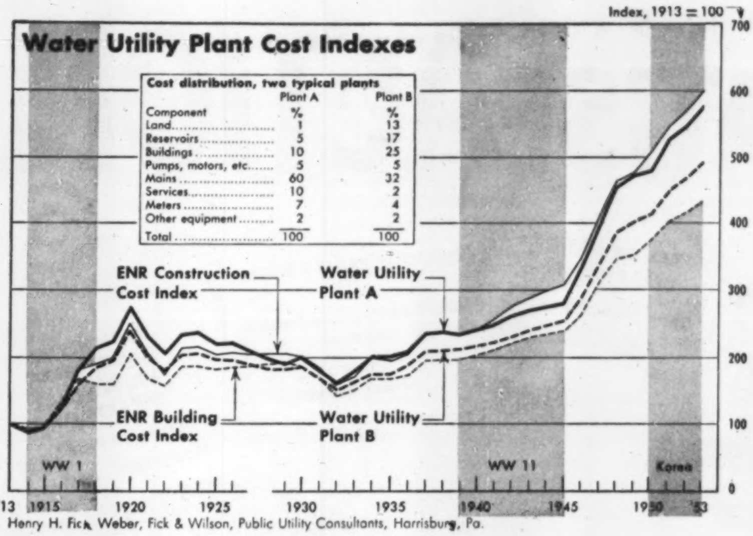


Water Utility Plant Cost Indexes

Cost distribution, two typical plants

Component	Plant A %	Plant B %
Land	1	13
Reservoirs	5	17
Buildings	10	25
Pumps, motors, etc.	5	5
Mains	60	32
Services	10	2
Meters	7	4
Other equipment	2	2
Total	100	100

Henry H. Fick, Weber, Fick & Wilson, Public Utility Consultants, Harrisburg, Pa.

Indexes used to develop Fick water works property component cost indexes

Building	1926	1932	1939	1940	1949	1952	Dec. 1952	1953	Dec. 1953
	Indexes, 1913=100								
Engineering News-Record Building Cost Index	185.0	140.9	197.4	202.8	351.8	415.6	425.3	430.9	435.9
E. H. Boeckh & Assoc brick & concr comm & factory bldg, Pittsburgh, Pa area	210.3	161.7	223.9	224.2	413.2	467.1	477.4	495.3	507.9
ICC Railroad constr index, station & office buildings, Group III (1910-14=100)	184.0	141.0	166.0	177.0	368.0	426.0	.....	438.0	.....
Handy-Whitman brick buildings index, North Atl. Div.	229.0	175.3	214.0	218.3	423.8	479.2	485.0	500.5	511.0
Materials									
8-in & larger cast-iron pipe, based on Iron Age Index, New York City	215.0	130.1	213.1	223.4	421.3	472.7	487.8	491.0	494.2
1½-in wrought-iron pipe, based on Handy-Whitman index, North Atlantic Div	254.5	228.2	226.4	226.4	380.9	421.5	440.0	440.5	456.3
Motors, based on Handy-Whitman index, North Atlantic Div.	134.2	134.0	147.8	147.0	232.0	296.5	295.0	308.5	317.0
Contractors' equipment, based on Marshall & Stevens index	158.7	114.1	130.8	132.4	255.7	282.2	283.0	282.2	290.8
Office equipment, based on Marshall & Stevens index.	136.8	101.1	123.5	127.2	220.9	247.2	247.3	251.0	252.3
Meters, private sources	162.5	162.5	147.7	147.7	265.9	310.2	310.2	317.7	332.7
Common Labor, based on Engineering News-Record labor index, 20-city average	288.4	224.7	359.5	367.9	763.2	914.7	956.3	985.3	1017.4
Construction, based on Engineering News-Record Construction Cost Index	208.0	157.0	235.5	242.0	477.0	568.9	587.5	600.1	611.5
Gas utility costs, based on Handy-Whitman index North Atlantic, Div	212.0	174.5	229.6	235.2	432.9	495.4	500.0	518.3	534.3

Petroleum refinery construction cost index

Compiled by W. L. Nelson, Petroleum Refinery Engineering Consultant, published by Oil & Gas Journal, Tulsa, Oklahoma—1946 = 100

	1926	1932	1939	1942	1945	1947	1948	1949	1950	1951	1952	1953	June 1954
NELSON Refinery Construction Index=1946=100	*72.0	*56.6	*76.6	*83.7	*89.9	117.0	132.5	139.7	146.2	157.2	163.6	173.5	179.2
EQUIPMENT													
Heat exchangers	75.0	60.0	76.0	93.5	91.9	115.0	130.0	133.0	140.0	152.0	165.8	162.5	166.6
Instruments (control)	....	90.0	89.5	85.5	90.6	113.0	120.0	122.0	127.8	142.3	146.2	156.4	159.5
Pumps, compressors, etc.	....	....	91.5	87.5	93.9	116.3	127.0	135.9	138.2	155.9	155.6	148.1	150.6
Electrical equipment	81.0	57.0	68.5	74.0	81.8	113.0	127.6	130.9	134.9	154.3	152.4	151.8	153.9
Internal combustion engines	....	....	84.5	84.5	91.7	100.0	116.9	124.8	126.0	146.1	146.5	174.9	175.9
Miscellaneous equipment average	*94.0	*79.0	*82.0	*85.0	*90.0	†114.2	†122.1	†121.6	†126.2	†145.1	153.3	158.8	161.3
MATERIALS	....	68.0	82.0	86.3	89.7	122.4	139.3	143.6	149.5	164.0	164.3	172.4	173.6
LABOR	....	49.0	73.0	82.0	90.0	113.5	128.0	137.1	144.0	152.5	163.1	174.2	183.0

* Approximate, projection back to these dates from other cost sources.

† Used to compute index until Apr 1952. Slightly different from the average of the miscellaneous equipment items shown

Equipment prices, mainly from manufacturers as quoted to Oil & Gas Journal •Materials Component from Bureau of Labor Statistics Wholesale Price Index, Code 10-1 Iron and Steel and Code 13, Building Materials •Labor, half skilled and half common labor as quoted by Engineering News-Record. For base costs see ENR Oct. 8, 1953. p, 115

Waterworks property cost index components—1913=100

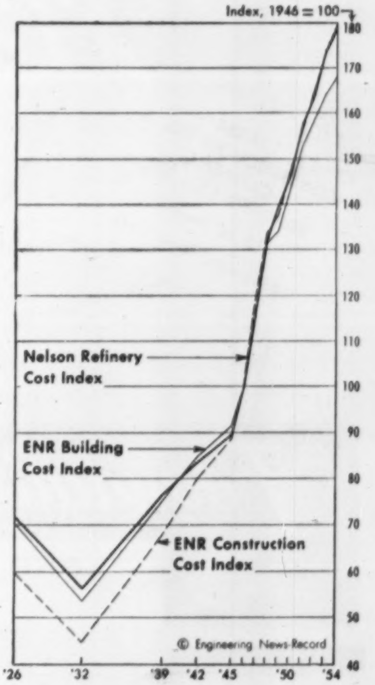
Henry H. Fick, Weber, Fick & Wilson, Public Utility Consultants, Harrisburg, Pa.

Year	Reservoirs	Buildings	Pumps and Motors	Distribution System	Services	Meters	Other Equipment
1926	208.0	210.3	134.2	237.0	269.1	175.0	147.0
1932	157.0	161.7	134.0	158.5	226.7	168.7	107.1
1939	235.5	223.9	147.8	257.0	283.6	168.8	126.9
1940	242.0	224.2	147.0	266.8	287.2	169.7	129.7
1941	257.8	229.9	147.0	273.7	297.2	189.8	140.0
1942	276.3	239.8	154.0	283.3	311.0	201.9	151.6
1943	289.9	247.9	154.0	291.1	322.0	204.5	152.5
1944	298.7	261.8	145.8	295.2	327.9	205.9	154.4
1945	307.7	278.2	148.2	300.1	334.9	207.5	155.9
1946	346.0	298.7	173.8	358.5	376.0	222.5	185.1
1947	413.2	341.0	210.0	428.8	435.8	235.6	225.3
1948	460.7	394.9	218.8	504.7	498.8	288.9	242.2
1949	477.0	413.2	232.0	523.8	545.3	315.6	237.0
1950	509.1	421.4	251.2	520.1	568.3	336.4	246.3
1951	542.0	448.1	297.0	581.3	603.4	364.5	249.0
1952	568.8*	467.1	296.5	605.3	633.6	370.7*	248.8
Dec. 1952	587.5	477.4	295.0	627.9	662.0	374.8*	249.3
1953	600.1	495.3	308.5	639.3	674.8	384.4	265.7
Dec. 1953	611.5	507.9	317.0	651.2	697.6	401.1	270.3

* Revised due to changes of source material subsequent to preparation of original computations.

Special purpose indexes tailored to fit individual properties are compared here with the ENR general purpose cost indexes together with an illustration of how two properties can vary in cost trends depending on the ratio of treatment plant and other buildings to supply and distribution system.

For a more detailed discussion of the purpose and construction of these indexes see ENR October 8, 1953, p. 113.



for SATISFACTION

Get Foundation Equipment Wellpoints

ROYAL IRRIGATION DEPARTMENT
Chao Phraya Dam
Thailand

BALFOUR BEATTY & CO., LTD.
Carmarthen Bay Power Station
South Wales,
Great Britain

MANCHESTER CORPORATION WATERWORKS DEPARTMENT
Therlmere Pipe Line
Manchester, England

MERRITT-CHAPMAN & SCOTT CORP.
Kindley Air Force Base
Bermuda

S. J. GROVES & SONS CO.
Garden State Parkway
Somers Point Interchange
New Jersey

SPENCER, WHITE & PRENTIS, INC.
Southern State Parkway
Valley Stream,
New York

TURNER CONSTRUCTION CO. & CAMPBELL BUILDING CO., INC.
I.B.M. Project
Kingston, New York

SMITH & JOHNSON, INC.
White River Generating Station
Indianapolis Light & Power Co.
Indianapolis, Indiana

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Overseas Associates
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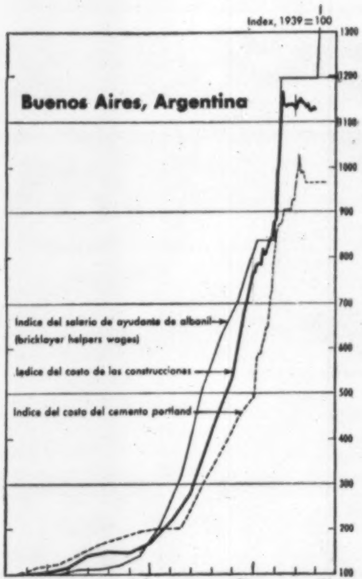
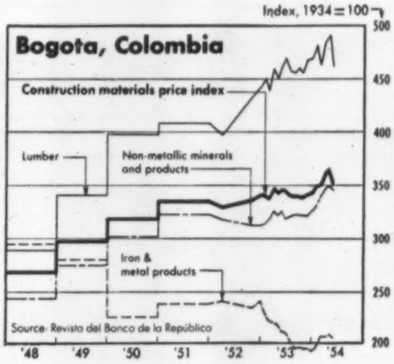
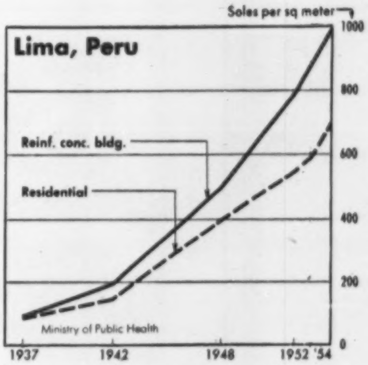
Construction cost trends around the world



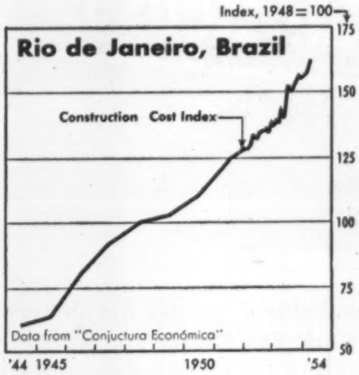
Source: Construcciones, published by Cámara Argentina de la Construcción



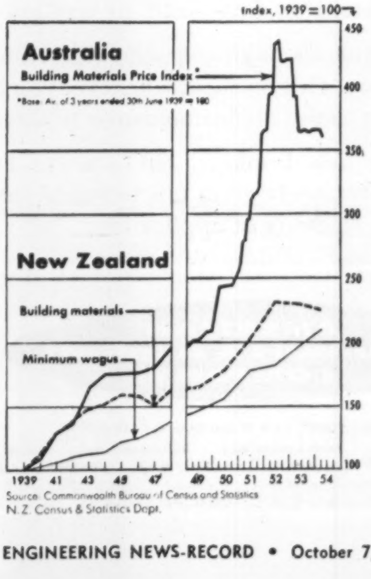
Source: Revista del Banco de la República



Ministry of Public Health



Data from "Conjuctura Económica"



Source: Commonwealth Bureau of Census and Statistics
N. Z. Census & Statistics Dept.

Anchorage, Alaska—Construction activity is running below the '53 level. Skilled and common labor are plentiful and materials are in good supply.

Honolulu, Hawaii—Supply of materials is good except for sand which is in short supply, causing a sharp price increase. Construction activity is running lower in '54 than '53 and there is a labor surplus.

San Juan, Puerto Rico—Construction activity is higher than '53. Large private housing projects are on the drawing boards and others are under construction. The government sold $21 million in bonds to finance public works in '54.

Havana, Cuba—Supply of materials is good, except for cement. Both skilled and common labor are plentiful. Construction activity in '54 is higher than in '53.

Mexico City, Mexico—Construction activity in '54 is below '53. Supplies of all materials are very good. Unskilled labor is plentiful and there is a fair supply of skilled.

Cuidad Trujillo, Dominican Rep.—Supply of construction materials is adequate. Many items are now imported from Europe which previously came from the U. S. Imports declined this year due to inventories carried over from '53. Unskilled labor is plentiful but not skilled labor. Private construction is expected to decline in '54 but government work—schools, hospitals, highways and irrigation projects—should hold at the '53 level.

Bogota, Colombia—Construction activity is substantially higher in '54 than in '53. There is a sufficient supply of construction materials, unskilled labor and skilled workers.

Lima, Peru—Excellent supply of construction materials. Steel imports have been very competitive, with European firms usually underbidding U. S. importers. No restrictions on imports . Unskilled and semi-skilled labor is plentiful. Skilled workers are available in Lima but short in the provinces . To beat skilled labor shortages on large jobs, foreign contractors have trained local labor in a short time. Some big government projects have been slowed down for economy reasons and new jobs are not being started. Private construction of office buildings in Lima and housing—this year is expected to be better than '53. Labor costs have increased about 50% since '53 and materials prices have risen gradually. Prices—imported materials increased due to the devaluation of the sol.

Buenos Aires, Argentina—Supply of materials is adequate excepting lumber used for concrete forms. Unskilled labor is plentiful due to slower industrial activity, but for skilled labor, the greater the skill the worse the shortage. Construction activity is slightly above the '53 level.

To speed up construction, Argentina's Central Bank set up new credit rules to streamline lending. The measure favors only those contractors on government projects.

Cost index shown in chart is described in ENR Nov. 1, 1951, p. 125.

La Paz, Bolivia—Supply of materials is bad due to the lack of foreign exchange. No electric or sanitary equipment is available or other imported materials. Many projects remain unfinished for months. Skilled labor is scarce but unskilled workers are plentiful. Construction activity is much below '53 on private work. There are many public works projects but they can't go ahead for lack of funds. According to one source, construction costs in Bolivia are in a state of "anarchy . . . affected always by the black market."

Caracas, Venezuela—Construction activity is about the same as in '53. Supply of materials is very good, although importation of structural steel requires about 45 days. Unskilled labor is plentiful and immigration is improving the supply of skilled.

Sao Paulo, Brazil—A new minimum

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These features add up to real savings on any maintenance program: you save the time and expense of heating: you eliminate the need of a special prime or tack coat: you work with local aggregate of all kinds, lowering the expense of importing material: you save time lost due to showers: and you can start work-season earlier, keep going later in the year.

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St. Louis 17, Mo. Inglewood, Calif. Oakland 1, Calif. Portland 7, Ore.
Washington 5, D. C. San Juan 23, P. R.

Construction materials prices around the world

Construction materials prices in national currency, fob city

North America and U.S. Territories

City	Structural steel per cwt		Reinf. steel ¾ to 1 in., per cwt		Portland cement per bbl		Lumber, 2x4, S4S, per Mftbm 1st class pine		Lumber, 2x4, S4S, per Mftbm 2nd class pine		Gravel 1½ in., per ton		Sand per ton	
	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Anchorage, Al.	$4.85[f]	$4.85[f]	$6.40[f]	$6.05[f]	$8.05[g]	$7.95[g]	$135.00[ch]	$135.00[ch]	$125.00[ci]	$125.00[ci]	$5.00[chz]	$5.00[chz]	$5.00[chz]	$5.00[chz]
Honolulu, Haw.	6.00[j]	6.00[j]	5.75[j]	5.75[j]	4.53	4.43	145.00[h]	145.00[h]	140.00[h]	135.00[h]	2.75	2.75	4.00	3.30
Montreal, Canada	8.00[uE]	7.00[u]	6.05[u]	4.90[u]	2.96	2.96	110.00[h]	175.00[h]	88.00[i]	85.00[i]	3.00[w]	2.25	2.25	....
New York, USA	7.48[ts]	7.20[ts]	7.01[saa]	7.01[ts]	3.70[p]	3.70[p]	113.00[lF]	115.00[lH]	120.00[hlG]	117.00[hlI]	2.85[rx]	....	1.90[rx]	....
Ottawa, Can.[c]	9.00[A]	8.00	8.00	7.00	4.88	4.88	200.00	225.00	80.00[i]	.....	1.50[x]	1.50[x]	1.50[x]	1.25[x]
San Francisco, USA	7.50[s]	7.25	6.85[t]	6.85[ts]	3.27[p]	3.16[p]	64.00[bh]	65.00[bh]	.....	.....	2.07	....	2.17	....
San Juan, PR	240.00[y]	240.00[y]	6.00[mB]	8.50[mC]	1.10[v]	1.05[v]	145.00	150.00	115.00	120.00	3.50[cn]	3.50[cn]	1.25[cnD]	1.25[cnD]
Winnipeg, Can.[c]	8.70	8.70	8.00[o]	7.70[o]	1.17[v]	1.17[v]	80.00[i]	82.50[i]	75.00[i]	77.50[i]	3.75[x]	3.75[x]	3.75[x]	3.75[x]

•[a] per cwt •[b] mill price; add freight •[c] delivered to job •[d] 20 tons or over •[e] No. 1 & No. 2 common •[f] fob dock, Seattle •[g] in bulk in paper bags, fob dock Seattle: 6/54, $4.46; 6/53, $4.36 •[h] Douglas Fir •[i] spruce •[j] base price Honolulu, 20 tons up •[k] winter prices: 1954, $7 per cu yd; 1953, $6.50 per cu yd •[l] truck lots, delivered •[m] ⅜" to 1" diam •[n] per cu meter •[o] ¾" diam price for 1" diam: 6/54, $7.85; 6/53, $7.65 •[p] bulk •[q] fob warehouse •[r] barge lots, asd •[s] base price, 5 tons to carlot •[t] base price •[u] add dom, prov, & munic sales taxes •[v] per bag, 87.5 lb •[w] 5 tons or more •[x] per cu yd •[y] per short ton •[z] effective July •[aa] 6.85 effective 9/54.

Ranges •[A] 8.00-9.00 •[B] 5.50-6.00 •[C] 7.50-8.50 •[D] up to 1.25 •[E] 7.25-8.00 •[F] 110-113.00 •[G] 115-120.00 •[H] 110-115.00 •[I] 112-117.00

Central and South America

City	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Bogota, Col.	680.00[ad]	.....	470.00[a]	550.00[a]	75.00[a]	77.00[a]	1.00[e]	1.30[e]	6.00[ef]	.....	15.00[g]	....	13.00[gh]	12.00[gh]
Buenos Aires, Arg.	3550.00[a]	2850.00[ai]	2300.00[a]	2300.00[a]	397.00[a]	391.00[a]	29.00[jB]	27.00[jA]	25.00[k]	23.00[k]	145.00[g]	140.00[g]	40.00[g]	40.00[gl]
Caracas, Venez.[c]	600.00[am]	650.00[am]	450.00[a]	480.00[a]	110.00[a]	110.00[a]	270.00[gn]	270.00[gn]	.....	.....	14.00[g]	14.00[g]	15.00[g]	15.00[g]
Ciudad Trujillo, DR	150.00[b]	150.00[b]	7.50[cD]	7.50[cD]	1.45[o]	1.45[o]	120.00[pE]	120.00[pE]	.....	.....	3.16[gqr]	3.16[gqr]	1.85[gq]	1.85[gq]
Havana, Cuba	400.00[bsF]	420.00[bsG]	116.00[b]	140.00[b]	4.77	4.75	.....	.....	160.00	163.00	3.88[g]	3.80[g]	3.75[g]	4.00[g]
La Paz, Bolivia	.....	.....	120.00[t]	83.00[t]	483.15[u]	329.00[u]	140.00[v]	84.00[v]	120.00[vw]	64.00[vw]	1120.00[g]	624.00[g]	1120.00[g]	624.00[g]
Lima, Peru	3.80[x]	3.00[xH]	2.35[x]	2.50[xI]	14.37[y]	13.12[y]	2.90[z]	2.50[z]	2.80[zaa]	.....	34.00[gbb]	34.00[gbb]	23.00[g]	24.00[g]
Mexico City, Mex.	1428.62[a]	1224.23[a]	1490.00[a]	1353.14[a]	160.00[agg]	160.00[agg]	1500.00	1350.00	1300.00	1100.00	69.00[ii]	55.00[ii]	....	....
Sao Paulo, Brazil	7,000[add]	.....	....	....	73.10[ee]	....	560.00[ff]	.....	1900[ghh]	.....	215.00[g]	180.00[g]	140.00[g]	120.00[g]

•[a] per metric ton •[b] per short ton •[c] per cwt •[d] round iron •[e] 20 x 20 cm, per meter •[f] cedar •[g] per cu meter •[h] washed, rough — fine: 6/54, 11.00; 6/53, 9.50 •[i] revised •[j] 3" x 4" spruce, per sq meter 1" thick •[k] 1" x 6" spruce, per sq meter 1" thick •[l] fine sand—6/54 price for coarse sand: 111.00/cu.m. •[m] fob mill •[n] saqui-saqui •[o] per 42.5 kg sack •[p] long leaf pine •[q] delivered to site •[r] up to ½ in diam: 3.50; big stone up to 1 ft diam: 2.85 •[s] erected •[t] per kilo •[u] per 42 kilos •[v] per ft •[w] price for "madera mara": 6/54, 80.00; 6/53, 32.00 per sq ft •[x] heavy, per kg—6/54 price for light shapes: 3.00 per kg •[y] per 42 kg sack •[z] per bd ft •[aa] tornillo •[bb] 1-in; 31.00 for 2 in, 6/54 and 6/53 •[cc] fabricated, ready for erection •[dd] imported: 8-9000 Cr •[ee] per 50 kg sack; imported: 90.00 Cr •[ff] 3" x 3", 4.27 meters long, per doz •[gg] Tolteca •[hh] beams of peroba, 6 x 12 cm, 5 meter length •[ii] Blue, per truckload (3½ cu meters)

Ranges •[A] 25.00-27.00 •[B] 27.00-29.00 •[C] 550.00-600.00 •[D] 7.25-7.50 •[E] 110-120 •[F] 360-400 •[G] 360-420 •[H] 2.50-3.00 •[I] 2.13-2.50

Europe

City	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Amsterdam, Nthlds.	401.70[am]	435.00[a]	381.00[a]	418.50[a]	55.50[a]	55.50[a]	229.00[bc]	219.00[bc]	.....	.....	7.04[c]	6.04[c]	4.65[c]	4.54[c]
Athens, Greece[f]	8[d]	6[d]	7[d]	5[d]	500[a]	400[a]	2,500[c]	1,800[c]	2,200[c]	1,600[c]	28[c]	24[c]	36[c]	32[c]
Bonn, W. Germ.	410.50[a]	.....	420.20[a]	....	75.00[a]	....	200.00[c]	.....	185.00[c]	.....	5.00[c]	....	7.00[c]	....
Brussels, Belg.	4,170[ae]	4,610[aeA]	4,325[ae]	4,575[ae]	659[ag]	665[ag]	36[hi]	36[hi]	30[hj]	29[hj]	85[k]	85[k]	32[l]	32[l]
Copenhagen, Den.	625.00[a]	884.00[a]	625.00[a]	825.00[a]	18.80[m]	20.30[m]	11.98[n]	11.98[n]	10.80[n]	10.80[n]	16.50[c]	16.50[c]	7.75[c]	7.75[c]
Geneva, Switz.	52.00[oq]	55.00[oq]	52.50[opq]	57.59[opq]	5.40[pr]	5.40[pr]	0.90[ps]	0.90[ps]	.....	.....	9.10[ct]	9.10[ct]	9.10[ct]	9.10[ct]
Helsinki, Fin.	63[dB]	75[dC]	54[dD]	69[dE]	403[r]	430[r]	.....	.....	42,000[uF]	43,000[uG]	820[c]	820[c]	700[c]	700[c]
London, Eng.	30/5/–[vw]	29/9/6[vw]	32/1/–[vw]	31/18/–[vw]	5/–/–[wx]	4/15/–[wx]	125[yH]	130[yI]	100[yJ]	105[yK]	–/18/–[z]	–/16/6[z]	–/20/6[z]	–/18/11[z]
Madrid, Spain	7,500[aL]	7,720[a]	3,200[abb]	3,200[abb]	416[apcc]	382[apcc]	2,800[cM]	2,500[cN]	1,500[cO]	1,500[cO]	40[clP]	35[cl]	17[clQ]	15[cl]
Oslo, Norway	40.10[ddee]	39.00[dd]	40.00[ddff]	42.50[dd]	115.00[ap]	109.00[ap]	1.170[n]	1.250[n]	1,100[n]	1,060[n]	16.00[pz]	14.80[z]	11.50[pz]	10.80[z]
Paris, France	68,380[ap]	61,180[ap]	72,030[ap]	73,680[ap]	7,711[ap]	7,711[ap]	30,265[cpaa]	32,373[cpaa]	21,642[cpaa]	24,111[cpaa]	2,221[aphh]	2,221[aphh]	1,975[aphh]	1,975[aphh]
Rome, Italy	82[dv]	75[dv]	7,400[qv]	8,800[qv]	1,060[pq]	1,050[pq]	36,000[cp]	40,000[cp]	33,500[cp]	33,500[cp]	1,600[cpii]	1,600[cpii]	870[cp]	850[cp]
Salzburg, Aust.	375.00[pqR]	280.00[pq]	350.00[pq]	320.00[pq]	447.50[ap]	447.50[ap]	.....	.....	800.00[cp]	720.00[cp]	36.00[cp]	36.00[cp]	40.00[cP]	40.00[cP]
Stockholm, Swed.	595[ap]	643[ap]	560[ap]	591[ap]	90.60[apjj]	93.80[ap]	2.27[s]	9.30[c]	1.29[s]	7.10[c]	11.00[cpS]	11.00[cpS]	10.00[cpT]	10.00[cpT]

•[a] per metric ton •[b] 1½" x 4" local equivalent •[c] per cu meter •[d] per kilogram •[e] add freight from basing pt •[f] prices are in 1000's of drachmae •[g] by barge •[h] 2½" x 7" per running •[i] Scandinavian •[j] domestic •[k] 8/20-in, on barge •[l] at quarry •[m] per 170 kg cask •[n] per cu ft •[o] carlots •[p] delivered •[q] per 100 kg •[r] per 50 kg sack •[s] per meter •[t] add 4.50 fr for delivery •[u] 6th cl pine timbers, untrimmed (4.672 cu meter equiv) •[v] mill price •[w] per long ton •[x] paper bags, delivered, 6 ton loads •[y] per 165 cu ft •[z] per cu yd price on barge 6/54: gravel 11.10; sand 6.70 •[aa] Vosges •[bb] 25-35 mm—5-8 mm: 6/54, 2700; 6/53, 2685—12-17 mm: 6/54, 2900-3000; 6/53, 2900 •[cc] incl 23p./ton tax •[dd] per cwt, over 10 metric tons; add extras 6/54 and 6/53: 13mm, 0.50; 10mm 0.75; 6mm, 2.00 •[ee] whse price; mill price 33.00 •[ff] whse price, round soft steel; mill price 32.00 •[gg] 2/5" diam •[hh] 1-in •[ii] 2-3 cm price of 5-cm 6/54 and 6/53; 1500 •[jj] 4.53 per 50 kg sack

Ranges •[A] 4530-4610 •[B] 58-63 •[C] 70-75 •[D] 52-54 •[E] 67-69 •[F] 40-42,000 •[G] 42-43,000 •[H] 105-125 •[I] 110-130 •[J] 90-100 •[K] 95-105 •[L] 7200-7500 •[M] 1600-2800 •[N] 1500-2500 •[O] 900-1500 •[P] 35-40 •[Q] 14-17 •[R] 350-375.00 •[S] 10-11 •[T] 9-10

Africa and Middle East

City	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Durban, So. Af.	70/–/–[amA]	33/–/–[alB]	1/17/–[bn]	2/8/–[b]	–/5/8[c]	–/5/2½[c]	–/13/54[dfo]	–/14/–[o]	–/12/6[dop]	.....	–/9/6[hi]	–/9/–[hi]	–/2/6[hik]	–/4/6[hi]
Johannesburg, So. Af.	34/–/–[aq]	36/–/–[aqD]	30/–/–[ar]	30/–/–[ar]	–/4/10½[c]	–/4/5[c]	–/4/–[os]	–/2/7[s]	–/2/5[s]	–/2/7[s]	–/14/–[h]	–/14/–[hE]	–/16/6[ht]	–/16/–[h]
Beirut, Lebanon	0.60[uF]	0.60[uF]	0.36[uG]	0.36[uG]	64.50[w]	64.50[w]	225[zx]	225[zx]	155[zy]	155[zy]	6.50[aa]	6.50[aa]	3.50[aa]	3 50[aa]
Tel-Aviv, Israel	405[ow]	275[ow]	350[ow]	350[ow]	58.75[w]	41.25[w]	240[aa]	135[aa]	220[aabb]	125[aabb]	3.24[aa]	2.725[aa]	1.45[aa]	1.20[aa]
Istanbul, Turkey	750[w]	650[w]	650[w]	580[w]	80[wcc]	60[wccM]	315[aaee]	240[aaee]	235[aaee]	200[aaee]	15[aaddH]	12[aadd]	12[aaddI]	10[aadd]

•[a] per long ton •[b] per cwt •[c] per 94 lb bag •[d] per cu ft, treated •[e] per short ton •[f] untreated: 11/11½ per cu ft •[g] untreated: 11/- per cu ft •[h] per cu yd •[i] at quarry •[j] at pit •[k] del, 10 mi. radius: progressive up to 7/6 •[l] mill price •[m] fabricated •[n] mill price: 1/11/6 fabricated: 2/8/- per cwt •[o] imported •[p] domestic lumber •[q] imported, fob port: 6/54, £37, if available; 6/53, £36 •[r] imported, fob port: 6/54, £32, if available; 6/53, £36 •[s] Oregon 9" x 3" per running ft •[t] river sand; pit sand, -/13/- •[u] per kilogram •[v] clear •[w] per metric ton •[x] Swedish fir •[y] white wood •[z] per cu ft, any size •[aa] per cu meter •[bb] European spruce: 6/54, 164.00; 6/53, 78.00 •[cc] fob plant •[dd] delivered at site •[ee] fob yard

Ranges •[A] £SA 65-70 •[B] £SA 32-33 •[C] -/10/- to -/14/- •[D] £32-36 •[E] £10-14 •[F] 0.35-0.60 •[G] 0.32-0.36 •[H] 12.00-15.00 •[I] 10.00-12.00

Asia and Australia

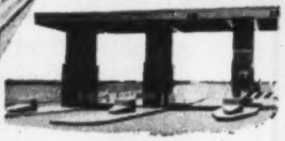
City	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Bombay, India	500/–/–[a]	500/–/–[a]	480/–/–[a]	480/–/–[a]	105/–/–[a]	105/–/–[a]	12/–/–[bc]	12/–/–[bc]	9/–/–[bc]	9/–/–[bc]	40/–/–[de]	40/–/–[de]	40/–/–[e]	40/–/–[e]
Tokyo, Japan	50,000[f]	65,000[f]	30,000[f]	39,500[f]	8,700[f]	8,800[f]	4,000[g]	3,000[g]	3,500[g]	2,500[g]	8,200	7,000	5,500	5,000
Manila, PI	800[fA]	800[fA]	480[fB]	430[f]	320	320	200[lC]	200[lC]	.....	.....	6.00[nD]	6.00[nD]	5.00[nE]	5.00[nE]
Melbourne, Aust.	43/–/–[at]	35/–/–[at]	38/–/–[au]	35/–/–[au]	10/8/6[ay]	10/8/9[ay]	14/10/–[w]	9/–/–[w]	5/12/6[wxI]	5/10/–[wxJ]	1/9/10[s]	1/10/–[s]	1/8/6[s]	1/15/–[sK]
Sydney, Aust.	.....	.....	....	....	10/12/6[ay]	11/7/6[a]	5/10/6[wz]	6/7/6[wz]	.....	.....	....	....	–/6/–[s]	–/6/–[s]
Wellington, NZ	3/–/–[op]	.....	2/12/–[oq]	....	13/–/–[aG]	....	3/15/3[rw]	.....	.....	.....	1/4/–[s]	....	1/15/–[s]	....

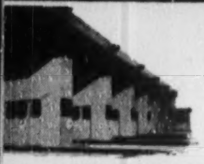
•[a] per long ton •[b] Indian teak •[c] per cu ft •[d] broken stone •[e] per 100 cu ft •[f] per metric ton •[g] per koku, 1' x 1' x 10' •[h] per tsubo •[l] Red Lauan •[m] per 94 lb bag •[n] per cu meter •[o] per cwt •[p] 22" x 7" •[q] 7/8" rounds •[r] Pinus or Rimu •[s] per cu yd •[t] imported: 6/54, 51/10/- to 62/15/-; 6/53, 45/-/- to 55/-/- •[u] imported: 6/54, 14/10/6 to 17/3/0; 6/53, 13/17/6 to 17/5/9 •[w] per 100 bd ft •[x] hardwood •[y] 10 long tons or more •[z] hardwood, unseasoned

Ranges •[A] 650-800 •[B] 370-480 •[C] 180-200 •[D] 5.00-6.00 •[E] 4.50-5.00 •[F] 2/10/- to 2/12/- •[G] 9/2/- to 13/-/- •[H] 11/-/- to 14/10/- •[I] 5/4/- to 5/12/6 •[J] 5/4/- to 5/10/- •[K] 1/10/- to 1/15/-

CHESAPEAKE BAY BRIDGE, MARYLAND

DELAWARE MEMORIAL BRIDGE
DELAWARE MEMORIAL BRIDGE


BAY ST. LOUIS BRIDGE, MISS.

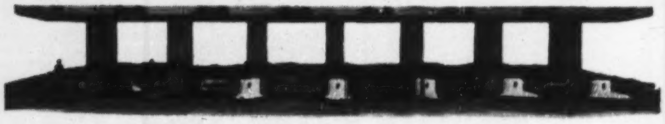

PENNSYLVANIA TURNPIKE

NEW YORK ZOO-LOGICAL PARK

SANDY POINT PARK, MD.

FLUSHING MEADOW PARKING LOT, N. Y.

NEW JERSEY TURNPIKE
NEW JERSEY TURNPIKE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Holland Tunnel, N. Y.-N. J.
Augusta Bridge, Maine
Bronx-Whitestone Bridge, N. Y.
Triboro Bridge, N. Y.
Charter Oak Bridge, Hartford
Rio Grande Gateway Bridge, Texas
Queens-Midtown Tunnel, N. Y.
Jones Beach Causeways, N. Y.
Mystic River Bridge, Boston
Sumner Tunnel, Boston
George Washington Bridge, N. Y.
Venetian Causeway, Fla.
Lincoln Tunnel, N. Y.-N. J.

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wage law will hit the construction industry hard. In its present form it doubles the minimum scale in both Sao Paulo and Rio. The law was suspended by the supreme federal tribunal but a large wage increase is due, whatever the court's final decision.

Materials prices are expected to rise during the balance of '54.

Cement is short and large quantities are sold on the black market. Cement plants now under construction won't be finished in time to increase '54 supplies and won't add much in '55.

A shortage of capital has slowed up the building boom and buildings aren't being completed as fast. A new building code is expected to go into effect by the end of '54 calling for structural steel in schools, theaters and other large assembly-type buildings.

Rio cost index (chart) is described in ENR Oct. 8, 1953, p. 117.

Melbourne, Australia—Building and construction costs declined little due to better availability of materials and the absence of unusually high profits and fancy wages or costly inducements to lure necessary manpower. Construction and building activity is running well ahead of last year. Relaxed restrictions have spurred materials and equipment imports to ease acute shortages. The government has a large homebuilding program and probably will proceed with additional public works. Foreign contractors are needed for big jobs and projects requiring speedy completion. That's a good sign for U. S. firms, which have the reputation of completing work on schedule or even earlier.

Manila, Philippine Is.—Materials supplies are ample except for cement. The government has authorized emergency cement imports from Japan totaling 75,000 tons. Supplies of both unskilled and skilled labor are adequate. The Congress approved a $500-million bond issue to pay for roads and other public works, but failed to pass the public works budget bill earlier this year. A special session is to be called to act again on this bill.

Bombay, India—Construction activity is stable and materials supplies adequate. Labor is plentiful and cheap due to the influx of an army of unskilled workers from the south.

Durban, Natal, So. Africa—Construction activity is on the upswing, keyed to the fairly rapid industrial expansion. Materials prices are relatively stable although cement is short and prices are up about 10%. Timber prices are down slightly. Skilled labor has never been so short. There has been no direct wage increase but costs of living allowances are higher.

Construction wages around the world

Rates per hour in national currency June 1953 and June 1954

North America and U. S. Territories

CITY and COUNTRY	Exch. rate June '54 per $1 US	Common Labor				Bricklayers		Carpenters		Structural ironworkers	
		Heavy constr.		Building							
		6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Anchorage, Alaska[a]	$1.00	$3.22	$3.095	$3.185	$3.06	$4.32	$4.195	$3.565	$3.565	$3.965	$3.84
Honolulu, Hawaii[a]	1.00	1.46	1.36	1.46	1.36	2.40	2.40	2.10	2.10	2.50	2.40
Montreal, Canada[el]	0.98$\frac{3}{16}$	1.25[k]	1.20	1.25	1.20	2.00	1.90	1.80	1.70	1.90	1.80
New York, USA[b]	1.00	2.415	2.11	2.415	2.11	4.15[h]	3.85[h]	3.57[h]	3.24[h]	3.975	3.50
Ottawa, Canada[e]	0.98$\frac{3}{16}$	1.10	0.90	1.10	0.90	2.00	1.90	1.75	1.65	2.00	1.85
San Francisco, USA[b]	1.00	2.125	1.85	2.125	1.85	3.475	3.40	2.905[i]	2.705[m]	3.075[j]	2.85
San Juan, PR[a]	1.00	0.65	0.65	0.35	0.35	1.00[B]	1.00[B]	0.90[A]	0.80	1.00[B]	1.00[B]
Winnipeg, Canada[g]	0.98$\frac{3}{16}$	1.25[ce]	1.25[ce]	1.05[de]	1.05[de]	2.10[f]	2.10[f]	1.90[f]	1.90[f]	1.95[f]	1.90[f]

•[a] 8-hr day •[b] including fringe benefits •[c] semi-skilled building laborers •[d] unskilled building laborers •[e] 48-hr wk •[f] 40-hr wk •[g] 30-mile radius •[h] 7-hr day •[i] $2.98 effective July '54 •[j] negotiating •[k] $1.40 effective August '54 •[l] plus 2% vacation pay •[m] $2.83 effective July '53
Ranges •[A] 0.85–0.90 •[B] up to 1.00

Central and South America

CITY	per $1 US	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Bogota, Colombia[ad]	2.50 Pesos	0.71	0.97	0.90	1.12	1.26	1.28	0.90	0.97	0.71	0.79
Buenos Aires, Arg.[abe]	14.00 Pesos	51.00	44.55	51.00	44.55	....	....	41.00	35.47	41.00	35.47
Caracas, Venez.[ace]	3.35 Bs.	25.70[B]	24.50	25.70[A]	24.50	25.70[B]	24.50	11.70	11.70	11.85	11.85
Ciuda Trujillo, Dom. R.[ae]	1.00 Rd.	4.50[f]	4.50[f]	4.50[fC]	4.50[fC]	6.00[D]	6.00[D]	1.50	1.50	1.50	1.50
Havana, Cuba[a]	$1.00	0.82	0.82	0.82	0.82	0.82	0.82	0.62	0.62	0.51	0.51
La Paz, Bolivia[a]	190.00 Bs.	60.00	40.00	80.00	50.00	85.00	55.00	....	....	43.00	34.00
Lima, Peru[a]	19.90 Soles*	39.98	26.39	39.98	26.39	45.45	30.00	28.03	18.22	23.90	18.22
Mexico City, Mex.	12.50 Pesos**	2.48	1.88	2.48	1.88	1.24[i]	1.13[i]	1.10	0.84	1.10	0.84
Sao Paulo, Brazil[ag]	20.00 Cr.	15.00	12.00	15.00[E]	12.00[E]	16.00[F]	13.00	9.00	8.00	7.00	6.00

•[a] 8-hr day •[b] plus 80% for insurance and other social changes •[c] workers paid 7 days, work 6; rates include adjustment for extra day's pay; 15 days per yr vacation •[d] incl 44% mark-up for social insurance, etc •[e] per day •[f] master tradesmen generally paid $30–$50 per mo; mason laying brick wall can get $50 per mo •[g] incl social ins., unemployment tax, indemnity reserve, vacation, other direct taxes pd by contractor
Ranges •[A] 21.50–25.70 •[B] 23.30–25.70 •[C] 3.50–4.50 •[D] 5.00–6.00 •[E] 13–15 •[F] 14–16 **6/53 rate was 8.65 pesos/$1 U.S. * 6/53 rate was 16.50 Soles/$1 U.S.

Europe

CITY	per $1 US	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Amsterdam, Nthlds.[b]	3.80 Gld.	....	....	....	....	2.018	1.876	2.020[c]	1.838[c]	1.905	1.803
Athens, Greece[a]	30,000 Drch.	68[K]	60[L]	58[M]	50[N]	120[O]	100[P]	120[O]	100[P]	120[O]	100[P]
Bonn, W. Germany[a]	4.20 DM.	1.90	1.84	1.71	1.67	2.00	1.76	2.00	1.96	2.00	1.96
Brussels, Belgium[ad]	50 Fr.	21.15[A]	21.15[A]	21.15[A]	21.15[A]	26.45[B]	16.45[B]	26.45[B]	26.45[B]	26.45[B]	26.45[B]
Copenhagen, Den.[e]	6.92 Kr.	....	....	....	....	6.49[e]	6.45[f]	5.81[e]	5.74[f]	....	....
Geneva, Switz.[a]	4.28 Sw. fr.	2.47	2.47	2.47	2.47	2.95	2.95	3.07	3.07	2.95	2.95
Helsinki, Finland[g]	231 Markkas	130	130	115	115	250[C]	250[C]	250[C]	250[C]	250[C]	250[C]
London, England[a]	£-/7/-	-/3/3½	-/3/2½	-/3/3½	-/3/2½	-/3/9	-/3/8	-/3/9	-/3/8	-/3/6½	-/3/4
Madrid, Spain[ah]	10.95 Pts.	3.72	3.10	3.72	3.10	4.80	3.95	4.65	3.85	4.80	3.95
Oslo, Norway[il]	7.14 N. Cr.	6.42	6.50	5.06	4.90	5.92	5.70	4.99	4.65	....	....
Paris, France[aj]	350 Fr.	163	157	163	147	201[F]	209[D]	205[E]	209[D]	213[G]	209[D]
Rome, Italy[ak]	624.75 Lire	265.38	258.63	265.38	258.63	296.40	288.25	325.72	317.00	325.72	317.00
Salzburg, Austria[a]	26 Sch.	6.10	5.70	6.05	5.50	7.05	6.50	6.95	6.50	6.95	6.50
Stockholm, Sweden[l]	5.18 Kr.	6.00[H]	6.00[H]	6.00[H]	6.00[H]	8.00[J]	8.00[J]	7.50[I]	7.50[I]	6.00	6.00[H]

•[a] 8-hr day •[b] total cost per hour, incl social charges, addit pay, based on "tariff-works" (piecework) rates basic rates—bricklayers: 6/54, 1.475; 6/53, 1.325—carpenters: 6/54, 1.477; 6/53, 1.327—struct irnwkrs: 6/54, 1.425; 6/53, 1.313 •[c] incl 0.02 g. per hr tool allowance •[d] 6-day wk •[e] 3Q 1953, excl overtime •[f] 3Q 1952, excl overtime •[g] 46½-hr wk except Jul-Aug, 45 hrs; skilled workers paid on piece work •[h] contractor pays addit 95% for social insurance •[i] 48-hr wk, based on piecework basic rates 6/54 are 3.24/hr common, 3.34/hr skilled •[j] incl social charges: 6/54, 41.74% (except 44.19% for carpenters); 6/53, 47% •[k] incl social insurance, pd holidays, & other social chgs •[l] 8½-hr day, incl 5½ hr Sat •[m] rates in 1000's of Drachmae
Ranges •[A] 19.80–21.15 •[B] 22.30–26.45 •[C] 200–250 •[D] 188–209 •[E] 185–205 •[F] 181–201 •[G] 201–213 •[H] 5.00–6.00 •[I] 6.50–7.50 •[J] 7.00–8.00 •[K] 58–68,000 •[L] 50–60,000 •[M] 48–58,000 •[N] 40–50,000 •[O] 110–120,000 •[P] 90–100,000

Africa and the Middle East

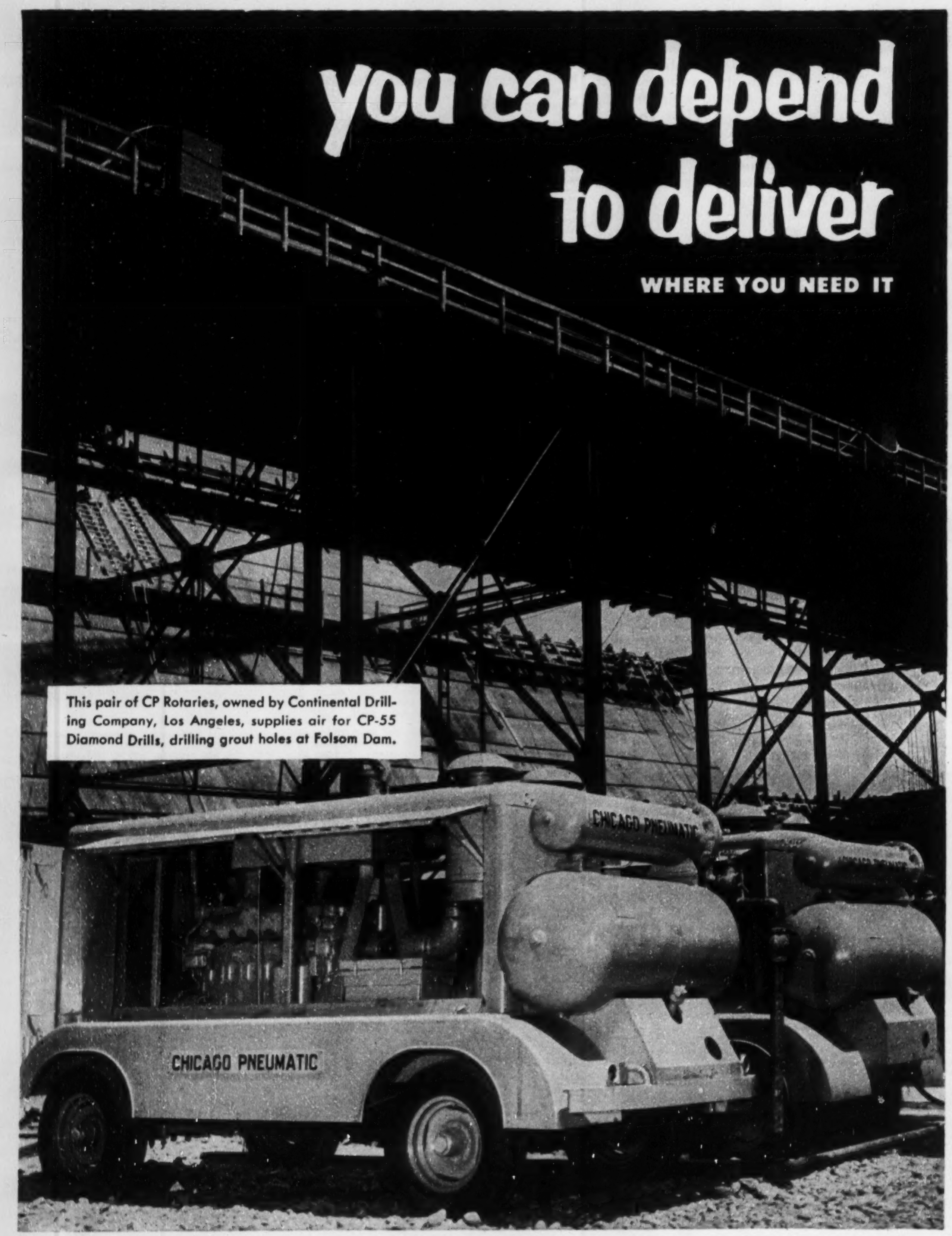
CITY	per $1 US	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Durban, So. Af.[ag]	£SA-/7/-	-/-/8½[c]	-/-/8½[c]	-/8/8½[c]	-/8/8½[c]	-/3/9[df]	-/3/9[ef]	-/3/9[df]	-/3/9[ef]	-/3/9[df]	-/3/9[e]
Johannesburg, So. Af.[g]	£SA-/7/-	-/-/17[hi]	-/-/17[i]	-/-/17[hj]	-/-/18[j]	-/4/10[e]	-/4/11[e]	-/4/10[e]	-/4/11[e]	....	....
Beirut, Lebanon[a]	£L3.19*	0.80[A]	0.80[A]	0.65[B]	0.65[B]	1.50[D]	1.50[D]	1.50[C]	1.50[C]	1.25[E]	1.25[E]
Tel-Aviv, Israel[akl]	£I 1.0**	....	....	7.06	5.85	7.98	6.75	7.98	6.75	....	....
Istanbul, Turkey[m]	2.825 liras	0.85[I]	0.70[H]	0.75[G]	0.60[F]	1.25[L]	0.90	2.00[K]	1.20[J]	2.00[K]	1.20

•[a] 8-hr day •[b] legal minimum rates; add cost of living allowance •[c] plus cost of living: -/13/9 per 40–42-hr wk; -/16/9 per wk over 42 hrs holiday pay: 6d/day, ½d/hr broken time •[d] plus -/3/3 per hr cost of living •[e] plus -/2/6 per hr COL •[f] holiday pay: 4.5d/hr •[g] incl COL allow, holiday fund, compensation ins, unemployment levy, benefit fund •[h] incl 0.06d per hr housing levy •[i] 9 1/5-hr day •[j] 8 1/5-hr day •[k] unorganized workers get 15–20% more on small private projects •[l] per day •[m] 10-hr day •* 6/53 rate: £L3.50 per $1 US •** 6/53 rate: £I 0.556 per $1 US
Ranges •[A] 0.70–0.80 •[B] 0.60–0.65 •[C] 1.00–1.50 •[D] 1.25–1.50 •[E] 1.00–1.25 •[F] 0.45–0.60 •[G] 0.60–0.75 •[H] 0.50–0.70 •[I] 0.60–0.85 •[J] 1.00–1.20 •[K] 1.50–2.00 •[L] 1.00–1.25

Asia and Australia

CITY	per $1 US	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53	6/54	6/53
Bombay, India[ab]	Rs 4/12/6	-/8/-	-/8/-	-/6/-	-/6/-	-/12/-	-/12/-	-/12/-	-/12/-	1/4/-	1/4/-
Tokyo, Japan[a]	360 Yen	54.00	46.00	66.00	56.00	84.00	75.00	75.00	69.00	81.00	69.00
Manila, PI[a]	2.00 Pesos	50.00	56.00	50.00	56.00	1.00[A]	1.00[A]	1.00[A]	1.00[A]	1.25[B]	1.25[C]
Melbourne, Aust.[ad]	£A-/8/11	18/12/2[D]	18/5/5[E]	18/12/2[D]	18/5/5[E]	21/3/3	20/10/-	20/8/5	20/2/4	16/2/6[F]	15/18/4[G]
Sydney, Aust.[a]	£A-/8/11	-/7/11½	-/7/11½	-/7/11½	-/7/11½	-/8/3	-/8/3	-/8/5	-/8/5	-/8/5	....
Wellington, NZ[ac]	£NZ-/7/1	10/18/4	....	10/9/11	....	11/13/5	....	11/16/8	....	11/4/7	....

•[a] 8-hr day •[b] per day •[c] per 40-hr wk, minimum rates •[d] per 40-hr wk (actual cost) incl pd holidays, statutory & unofficial addit base rate, excl addits—common labor: 6/54, 14/2/6 to 14/11/8; 6/53, 13/19/2 to 14/8/4—bricklayers: 6/54, 16/3/4; 6/53, 15/18/4—carpenters: 6/54, 16/2/6; 6/53, 15/19/2
Ranges •[A] 0.75–1.00 •[B] 0.75–1.25 •[C] 1.00–1.25 •[D] 18/-/12 to 18/12/2 •[E] 17/13/9 to 18/5/5 •[F] 12/1/- to 16/2/6 •[G] 11/12/- to 15/18/4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CHICAGO PNEUMATIC
CHICAGO PNEUMATIC

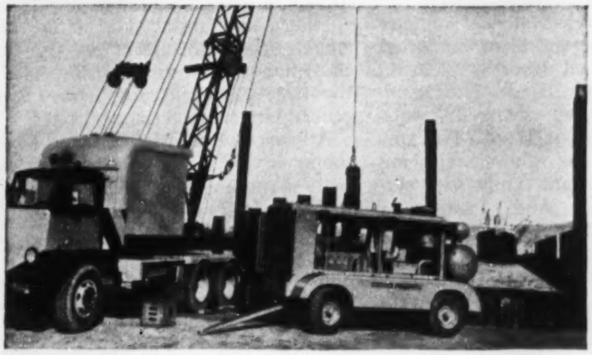
This pair of CP Rotaries, owned by Continental Drilling Company, Los Angeles, supplies air for CP-55 Diamond Drills, drilling grout holes at Folsom Dam.

on CP Rotaries air...

WHEN YOU NEED IT

The ability to operate thousands of hours without time out for repairs has won ready acceptance for CP Rotary Portable Compressors throughout the construction industry. Their freedom from vibration, compactness and light weight, low oil consumption and low air discharge temperature are but a few of the characteristics that appeal to compressed air users everywhere. They're available with Hercules gasoline engines in capacities of 125 and 210 cfm.; and General Motors diesel engines in capacities of 210, 365 and 600 cfm. For detailed information, write for Bulletin 734. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, New York.*

◄ Here's another team of CP Rotaries. This time they're ganged up to meet air demands at a power project in North Carolina.



◄ This dependable CP Portable Rotary is furnishing air for pile driving at Encinal Terminal in Richmond, California.

Capacities: 125, 210, 365, 600 cfm.

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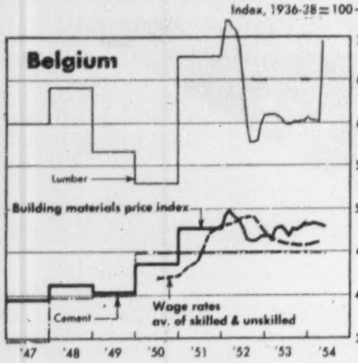
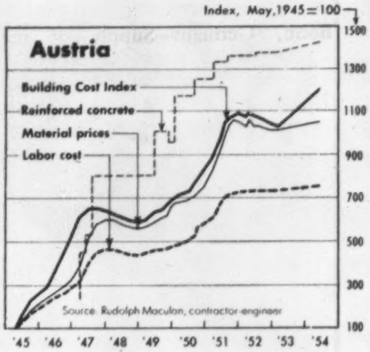
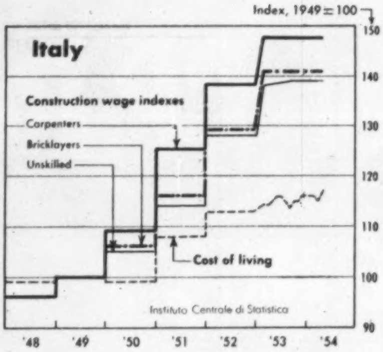
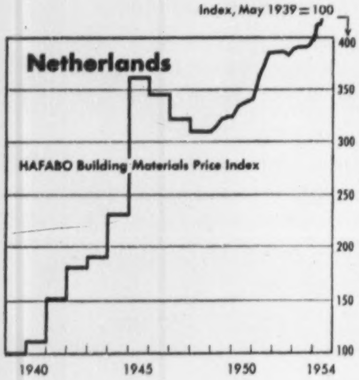


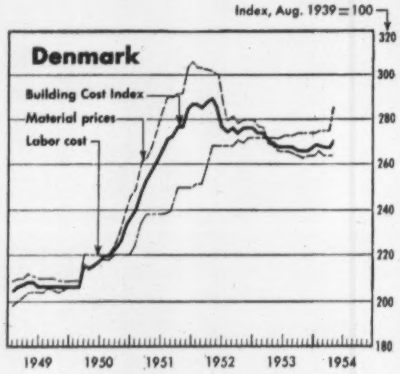


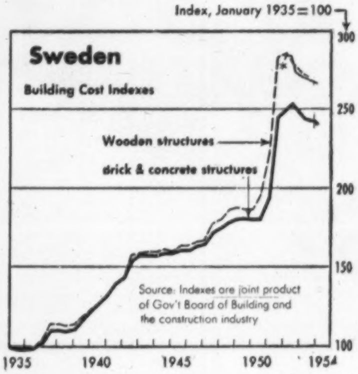
Source: Rudolph Maculan, contractor-engineer



Instituto Centrale di Statistica







Source: Indexes are joint product of Gov't Board of Building and the construction industry

. . . Construction trends around the world

Johannesburg, So. Africa—Materials generally in good supply but there are periodic shortages of steel and imported lumber. Supply of skilled workers is adequate but most firms are paying them more than the minimum. Unskilled workers are becoming a little scarce because migrant natives who had been a source of supply are despised by town-dwelling natives. Construction activity continues steady.

Tel-Aviv, Israel—Materials supplies adequate except for some imported timber. Unskilled labor is plentiful and skilled supply is adequate. Construction is higher than '53, with materials restrictions lifted. The government is going ahead replacing temporary immigrant camps with permanent housing. And construction activity is expected to continue at the current level for at least two more years. Opportunities are particularly good to foreign contractors willing to work on a 50/50 basis with Soleh Boneh Ltd. of the General Labor Confederation. The Israel cost index shown in the chart is described in ENR Oct. 8, 1953, page 119.

Beirut, Lebanon—Materials and both unskilled and skilled labor are in good supply. New mills recently built have increased cement production. A slight decline in apartment houses and other buildings is offset by more factory and public works construction. Costs vary slowly from year to year in this country, but the declining value of currency raises costs of imported materials.

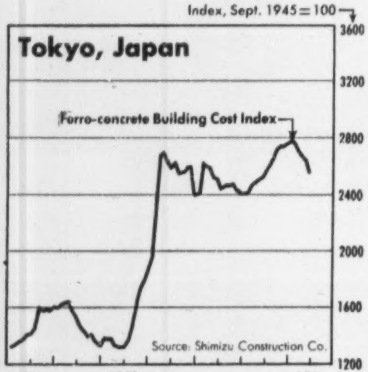
Istanbul, Turkey—Construction is booming. Large quantities of high-cost imported cement are being used to supplement local production. Reinforcing steel, timbers, sanitary equipment, black and galvanized pipe, hardware and glass are all scarce, due to lack of foreign exchange.

Skilled and unskilled labor are becoming scarce because of the growing construction industry and especially the large-scale dam and harbor and general city construction.

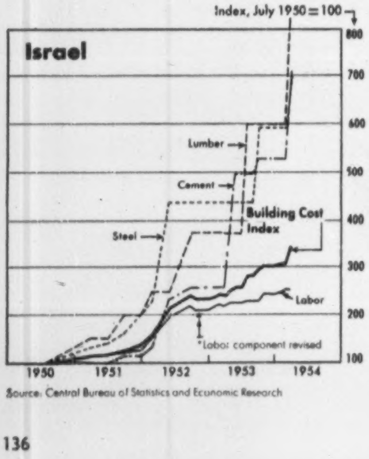
Athens, Greece—Materials and labor supply is very good. Construction activity is running 40% ahead of '53.

Rome, Italy—No shortage of building materials. New cement mills have boosted capacity by about 25%. Shortage of skilled labor forces contractors to pay much more than the minimum rates. Construction activity is trending upward after a slow start. Housing is on the rise and should be high in '55 if the shortage is to be relieved. In April '54, the payroll tax was reduced from 4% to 3%, and may be repealed in '55.

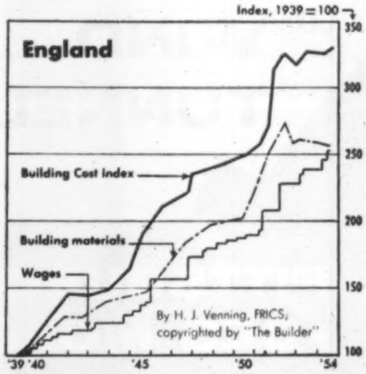
Salzburg, Austria—Building material supplies are abundant, and both skilled and unskilled labor are plentiful. Construction activity is higher than in '53 because of the new highway from



Source: Shimizu Construction Co.



Source: Central Bureau of Statistics and Economic Research



Salzburg, Austria—Building material supplies are abundant and both skilled and unskilled labor are plentiful. Construction activity is higher than in '53 because of the new highway from Salzburg to Vienna and other road projects. Power plant and housing construction are going strong.

Geneva, Switzerland—Materials supplies are good, although heavy demand at time causes delivery delays. Construction activity is up sharply, nearly 50% above a year ago. Skilled and unskilled labor are plentiful thanks to Italian masons and laborers whose number has nearly doubled in a year's time.

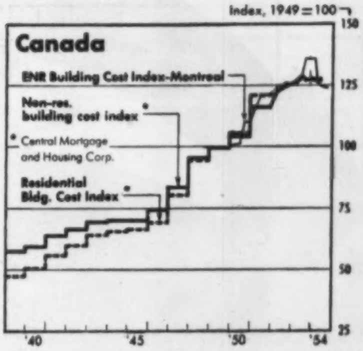
Paris, France—Materials supply is good. Skilled and unskilled labor are adequate but an increase in construction activity could quickly cause a shortage of skilled. Housing plans call for twice as many units to be constructed in '55 as in '53. To remedy the housing shortage, France needs 240,000 new units annually for the next 30 years and this rate should be reached in '55.

Bonn, Germany—Supply of materials is good except for the usual July-August shortage of roofing tiles. Skilled and unskilled labor are plentiful although temporarily short in July and August. Construction activity this year is about 5% ahead of '53.

Prices and wage rates for Frankfurt are not reported this year. However, for purposes of comparison with last year's report, construction wage rates are about the same in all large German cities. Structural shapes are DM 16.30 per metric ton cheaper in Bonn than Frankfurt because of lower freight costs. Sand and gravel are about DM 1.00 per cubic meter cheaper in Bonn for the same reason. Lumber is about 6% cheaper in Frankfurt than in Bonn.

Brussels, Belgium—Construction is booming in this city, mainly apartments and office buildings. There are no materials shortages.

London, England—Materials are in good supply although bricks and cement are short in some areas. Skilled labor is difficult to get because of high employment. Construction activity should be greater in '54 than '53 due to more housing and factory building.



Amsterdam, Netherlands—The large volume of construction has created a tight materials market. Bricks are in short supply and deliveries are slow for roofing tiles, steel windows and wall tiles. An abundance of carpenters is threatening but there is a shortage of bricklayers, concrete carpenters, reinforced concrete workers and granite workers.

Canada construction cost indexes

Central Mortgage and Housing Corp. 1949 = 100

Non-residential				Residential			
'39	57.9	'47	84.3*	'39	48.1	'47	80.9*
'40	60.0	'48	95.3*	'40	51.2	'48	95.0
'41	63.9	'49	100.0	'41	56.0	'49	100.0
'42	67.2	'50	105.2*	'42	60.0	'50	106.1*
'43	69.5	'51	118.9*	'43	63.7	'51	123.2*
'44	70.5	'52	125.4*	'44	66.4	'52	126.7*
'45	71.1	'53	127.4	'45	67.2	'53	127.4
'46	75.0	'54 Jun	127.6	'46	70.4	'54 Jun	128.4

Weighted indexes of wholesale prices and wage rates. Intangibles, productivity, etc., not included. * Revised

Canadian wage and cost of living changes—1945–'52

Unweighted average wage increases for 8 principal construction occupations (including vacation pay allowances)

	Per cent increase in wages				in cost of living			
City	'45-'54†	'51-'52	'52-'53	'53-'54	'45-'54†	'51-'52	'52-'53	'53-'54
Halifax	74.4	12.9	3.0	1.8	46.6	3.2	−2.7	0.1
St. John	73.3	6.0	4.3	0.3	53.1	3.1	−2.1	0.3
Montreal	96.5	7.8	1.8	5.0	57.1	4.3	−0.6	−0.1
Toronto	98.7	3.8	2.8	4.1	57.6	2.8	−0.6	1.4
Winnipeg	84.1	11.1	7.3	0.0	53.6	3.8	−1.1	0.3
Saskatoon	103.9	11.0	6.7	3.6	54.2	3.4	1.1	0.2
Edmonton	98.5	9.3	4.6	4.2	51.9	4.0	0.3	0.1
Vancouver	107.3	7.1	10.8	2.3	59.2	2.4	−0.4	0.3
Average, 8 cities	92.1	8.6	5.2	2.7	54.2	3.4	−0.8	0.3

† 10/'45 to 7/'54; other % chgs Jul 1 to Jul 1.

Canadian building trades wage rates July 1, 1954

Dominion Department of Labour, and Canadian Construction Assoc.

	Bricklayers				Carpenters				Electricians				Painters			
City	1939J	1945J	1953	1954	1939J	1945J	1953	1954	1939J	1945J	1953	1954	1939J	1945J	1953	1954
Halifax[a]	$1.00	$1.15	$1.69	$1.81[b]	$0.70	$0.95	$1.56	$1.56[b]	$0.85	$1.06	$1.66	$1.66[c]	$0.60	$0.81	$1.32	$1.37[d]
Saint John	0.90	1.10	1.80	1.80	0.50–0.60	0.81	1.50	1.53	0.50–0.65	0.85	1.57	1.57	0.50–0.55	0.76	1.34	1.34
Quebec	0.75–0.85	1.00	1.60	1.70	0.55–0.60	0.80	1.40	1.50	0.55–0.65	0.80	1.40	1.45[b]	0.50–0.55	0.75	1.35	1.45
Montreal	0.80–0.90	1.06	1.90	2.00	0.70	0.96	1.70	1.80	0.75	1.01	1.85	1.90	0.66	0.86	1.60	1.70
Toronto	1.00	1.23	2.35	2.35[f]	0.90	1.11	2.20	2.20[f]	1.00	1.21	2.33	2.33[f]	0.75	0.97	1.85	1.95
Hamilton	0.90	1.19	2.15	2.30	0.75	1.04	2.00	2.10	0.75	1.05	2.00	2.25	0.65	0.86	1.65	1.65[d]
Windsor	1.15	1.26	2.25	2.40	0.95	1.18	2.00	2.17	1.15	1.26	2.20	2.35	0.60–0.65	0.95	1.65–1.70	1.80
Winnipeg	1.10	1.25	2.10	2.10	0.85	1.05	1.90	1.90	0.85	1.05	1.90	1.90[d]	0.70	0.90	1.65	1.65
Saskatoon	1.00	1.20	2.13	2.18	0.50–0.75	0.96	1.80	1.85	0.70–0.80	0.93	1.90	2.00	0.50–0.70	0.70	1.50	1.65
Edmonton	1.10	1.31	2.22	3.20	0.90	1.03	1.85	1.95	0.85	1.06	2.15	2.25	0.80	0.91	1.55	1.65
Vancouver	1.10	1.29	2.32	2.40	0.75–0.90	1.12	2.17	2.22	0.75–1.00	1.19	2.30	2.30[d]	0.63–0.80	0.97	2.07	2.12

	Plasterers				Plumbers				Sheetmetal Workers				Labourers			
	1939J	1945J	1953	1954	1939J	1945J	1953	1954	1939J	1945J	1953	1954	1939J	1945J	1953	1954
Halifax[a]	$0.80	$0.95	$1.70	$1.70[h]	$0.85	$1.02½	$1.65	$1.65[b]	$0.70	$0.85	$1.47	$1.47[d]	0.30–0.40	$0.52	$1.06	$1.10[d]
Saint John	0.90	1.10	1.80	1.80	0.60–0.70	0.88	1.55	1.55	0.50–0.65	0.81	1.25	1.25	0.30–0.40	0.53	0.75–1.15	0.75–1.15
Quebec	0.75	1.00	1.60	1.70	0.55–0.65	0.80	1.40	1.45[b]	0.55–0.65	0.80	1.40	1.50	0.40	0.60	1.05–1.15	1.15–1.25
Montreal	0.80	1.06	1.90	2.00	0.75	1.01	2.00	2.00[e]	0.65–0.75	0.96	1.70[e]	1.80	0.40	0.61	1.15	1.25
Toronto	0.90	1.21	2.15	2.40	1.00	1.17	2.15	2.35	0.93	1.18	2.20[h]	2.25[f]	0.35–0.50	0.67	1.20	1.25
Hamilton	0.90	1.07	2.15	2.25	0.85	1.07	2.05	2.15[g]	0.75	1.04	2.00	2.15	0.35–0.45	0.65	1.00–1.10	1.10–1.15
Windsor	0.90	1.15	2.00	2.20	1.00	1.25	2.20	2.35	0.70–0.85	1.06	2.00	2.20	0.55	0.75	1.20–1.50	1.62–1.67
Winnipeg	1.10	1.25	2.10	2.10	0.95	1.15	2.00	2.00	0.70	0.85	1.75	1.75[d]	0.40–0.45	0.63	1.05–1.25	1.05–1.25
Saskatoon	0.75–1.00	1.06	2.00	1.80–2.00	1.00	1.06	2.00	2.00[h]	0.75–0.90	0.81–0.85	1.65	1.80	0.30–0.40	0.58	1.23	1.28
Edmonton	1.05	1.31	2.125	2.225	1.05	1.16	2.15	2.25	0.90	1.07	2.05	2.05[i]	0.40–0.50	0.61	1.25	1.30
Vancouver	1.00	1.10	2.25	2.30	1.00	1.19	2.25	2.35	1.00	1.18	2.25	2.25[d]	0.45–0.50	0.71	1.55	1.60

•[a] 1953 and 1954 wage rates do not include hourly allowances in lieu of vacation pay •[b] 5¢ an hour increase pending •[c] $1.71, 7/22/54 •[d] negotiating •[e] decision pending on arbitration board award •[f] in conciliation •[g] $2.25, 9/1/54 •[h] $2.10, 7/6/54 •[i] $2.15, 8/1/54 •Note: Vacation pay assessments for above trades are: Halifax—3¢ for all skills shown except 4¢ for carpenters & electricians, none for labourers; Quebec—2%; Montreal—2%; Toronto—4%; Hamilton—2% for painters and labourers, 4% for other trades shown; Windsor—4%; Winnipeg—2%; Saskatoon—4%; Edmonton—4%; Vancouver—4% for plumbers and sheetmetal workers, 2% for others

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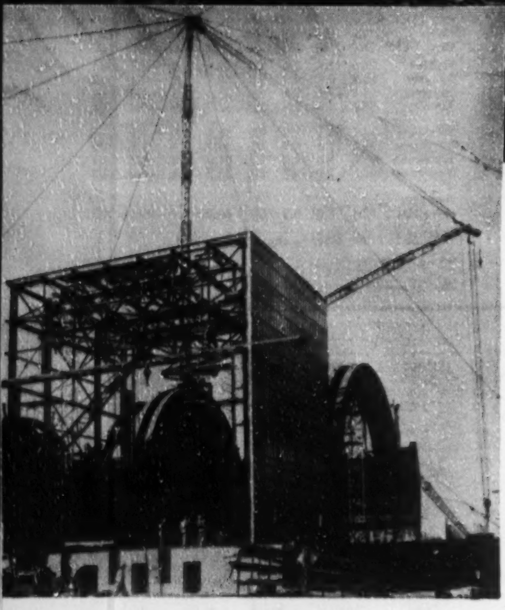

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DES MOINES (8), 915 Tuttle Street
DALLAS (1), 1219 Praetorian Bldg.
SEATTLE . . . . 522 Lane Street
SANTA CLARA, CAL., 621 Alviso Road

Construction materials prices in 20 cities

Market quotations on construction materials as reported to Enginering News-Record

ENR 20-Cities	CEMENT, Bulk per bbl CL lots, fob city Incl. Dealer Disc 1953 Low	High-Dec.	SAND, per ton Truck lots or over fob city 1953 Low	High-Dec.	CONCRETE, READY MIXED 1:2:4 over 50 cy per cy delivered 1953 Low	High-Dec.	BRICK, CLAY BACKING per M quantity delivered 1953 Low	High-Dec.	STRUCTURAL CLAY TILE Partition, Scored, 3 x 12 x 12, per M, 2000 pieces or over delivered 1953 Low	High-Dec.
Average	3.22	3.34	2.12	2.18	11.37	11.98	31.61	32.91	154.39	159.86
Atlanta	3.50	3.56	1.75	1.83	11.99	12.06	27.38	27.38	195.00	195.00
Baltimore	3.45	3.60	2.00[f]	2.00[f]	11.25	11.45	36.00	36.00	183.00	186.00
Birmingham	2.60[b]	2.60[b]	2.08	2.08	9.85	11.00	23.50	23.50	126.00[v]	126.00[v]
Boston	3.69	3.84	2.50	2.50	11.50[m]	12.00[m]	34.50[v]	36.85[v]	196.00[w]	196.00[w]
Chicago	3.02	3.17	3.40[f,g]	3.65[f,g]	11.94	11.94	23.00	26.00	135.00	135.00
Cincinnati	3.40	3.55	2.14[f,h]	2.24[f,h]	10.95	11.45[k]	34.50[v]	45.00[v]	185.00[v]	185.00[v]
Cleveland	3.01[b]	3.04[b]	1.65	1.65	13.50[n]	15.50[n]	32.00	34.50	170.00	172.00[aa]
Dallas	2.65	2.85	1.84	1.84	9.30	9.40	19.75	19.75	......	......
Denver	3.59	3.74	1.20	1.20	10.50	10.50	34.00	34.00[t]	......	......
Detroit	3.00[e]	3.02[c]	3.75[f,g]	3.75[f,g]	10.70	12.00	35.25[v]	37.50[v]	127.75	130.00
Kansas City	3.03	3.12	1.50[f]	1.50[f]	11.35[o]	12.25[o]	25.75	28.50	115.50	127.50
Los Angeles	3.60[a]	4.00[a]	1.95	2.11	10.43[p]	11.78[p]	24.50[w]	27.50[w]	......	......
Minneapolis	3.49	3.64	1.35[f]	1.50[f]	11.90	12.75	32.00	35.00	171.50[v]	175.00[v]
New Orleans	3.02	3.02	1.82	1.82	12.90	12.90	31.00[v]	31.00[v]	170.00	170.00
New York	3.55	3.70	1.60[g,i]	1.80[g,i]	11.80[r]	13.55[r]	35.00	37.00	138.70[x]	140.95[x]
Philadelphia	3.30	3.45	2.15[f]	2.35[f]	11.50	12.50	32.00	32.00	126.30	145.30
Pittsburgh	3.04	3.19	2.20[f]	2.20[f]	12.50	13.00	36.00	36.00	112.00	112.00
St. Louis	3.03[d]	3.22[d,e]	2.50[d,j]	2.70[d,j]	10.40	11.40	40.00	40.00	139.00[v]	156.50[v,bb]
San Francisco	2.96	3.16	2.02	2.02	10.70[s]	11.25[s]	37.00	37.00	156.85[y,z]	156.85[y,z]
Seattle	3.25[a]	3.45[a,e]	3.00[d,f,g]	3.00[d,f,g]	11.40	11.90[l]	34.00	39.00[u]	175.00[v]	223.00[v]
Montreal	2.86[a]	2.96[a]	2.25[h]	2.25[h]	9.65	11.10	31.00	38.50	150.00	165.00

•[a] subj to 10¢ disc •[b] truckload lots, destination price •[c] mill price plus freight •[d] less 2% for cash •[e] Dec. $3.35 •[f] delivered •[g] per cy •[h] 5 tons or more •[i] barge lots asd •[j] Dec. $2.80 •[k] Dec. $10.95 •[l] Dec. $11.40 •[m] 50¢ cash disc •[n] 7–9 mi. zone •[o] 25 cy plus •[p] 1:2¼:4 mix •[r] 5 cy or more deliv Man •[s] 10–100 cy •[t] Dec. $37.25 •[u] Dec. $34.00 •[v] truck loads •[w] fob yard •[x] fob trucks, job site •[y] smooth •[z] fob Stockton •[aa] Dec. $170.00 •[bb] Dec. $142.00

LUMBER, No. 2 Common or better, 2 x 4 s4s

ENR 20-Cities	Short Leaf Yellow Pine 1953 Jan. High	Low	Dec.	1954 Jan.	Aug.	Douglas Fir 1953 Jan. High	Low	Dec.	1954 Jan.	Aug.
Average	93.50[p]	90.90	91.32	91.05	93.22	107.63[r]	99.21	99.21	99.82	115.51
Atlanta[a]	73.50[j]	69.00	73.50	73.50	73.50	......	......	......	......	......
Baltimore[b]	79.00[k]	75.00	79.00	78.50	80.00	102.00	94.00	94.00	94.00	120.00
Birmingham[a]	70.50	70.50	70.50	70.50	70.50	80.50	70.50	70.50	70.50	100.00
Boston[b]	98.00[i]	92.00[i]	92.00[i]	94.00[i]	96.00[i]	103.00[c]	92.00[c]	92.00[c]	95.00[c]	113.00[c]
Chicago[d]	92.00	85.50	85.50	86.50	91.50	104.50	96.00	96.00	97.00	114.00
Cincinnati[b]	88.00	83.75	83.75	81.25	79.25	117.00[s]	106.00	106.00	106.00	109.25
Cleveland[d]	87.00[l]	85.00	87.00	87.00	90.00	104.00[t]	92.00	92.00	92.00	108.00
Dallas[a]	76.00[m]	69.00	76.00	76.00	68.00	......	......	......	......	......
Denver[b]	......	......	......	......	......	137.00[h]	101.00[h]	101.00[h]	101.00[h]	122.00[h]
Detroit[e]	101.00	100.00	100.00	100.00	110.00	110.50	93.50	93.50	93.50	104.50
Kansas City[b]	122.00	102.50	102.50	102.50	110.00	122.00	105.00	105.00	105.00	130.00
Los Angeles[f]	......	......	......	......	......	96.00[f]	82.00[f]	82.00[f]	85.00[f]	112.00[f]
Minneapolis[g]	......	......	......	......	......	135.00[g]	135.00[g]	135.00[g]	135.00[g]	145.00[g]
New Orleans[a]	92.50	92.50	92.50	92.50	92.50	112.00[u]	95.00	103.50	109.50	123.50
New York[h]	117.50[n]	112.50	117.50	113.50	117.50	122.50[v]	114.50	122.50	119.50	122.50
Philadelphia[e]	120.50	118.50	118.50	118.50	118.50	137.50	135.00	135.00	135.00	143.00
Pittsburgh[a]	92.50	92.50	92.50	92.50	95.00	115.00	115.00	115.00	115.00	125.00
St. Louis[g]	107.00	99.00	99.00	99.00	106.00	116.75[w]	109.75	109.75	109.75	130.00
San Francisco[a]	......	......	......	......	......	70.00[a]	56.00[a]	58.00[a]	59.00[a]	75.00[a]
Seattle[a]	......	......	......	......	......	80.00[a]	75.00[a]	75.00[a]	75.00[a]	82.50[a]
Montreal	92.00[i,o]	85.00[i]	92.00[i]	92.00[i]	88.00[i]	175.00	165.00	165.00	165.00	110.00

•[a] fob mill •[b] fob city CL out of yard •[c] asd •[d] fob city CL dir mill •[e] deliv to contr •[f] retail LCL at yard •[g] retail LCL deliv •[h] deliv truck lots •[i] spruce •[j] Jan $89 •[k] Jan $77.50 •[l] Jan $86 •[m] Jan $89 •[n] Jan $112.50 •[o] Jan $85 •[p] Jan $93.20 •[r] Jan $107.10 •[s] Jan $111.50 •[t] Jan $99 •[u] Jan $95 •[v] Jan $117.50 •[w] Jan $111.75

Building materials prices

ENR average yearly prices at New York, except steel

Year	Brick common per M	Cement per bbl	Lime per bbl	Pine per M ft bm	Steel shapes per cwt h
1874...	$7.41	$1.48R	$1.50a	$26.00d	.....
1898...	6.65	2.25R	.95a	21.75d	.....
1907...	6.16	1.55C	.95a	30.50d	1.75
1913...	6.75	1.18C	.915a	25.04e	1.50
1929...	11.71	2.23C	2.25b	64.50f	1.92
1932...	9.75	1.62C	2.25b	39.91f	1.56
1938...	13.10	2.12C	2.80b	59.33f	2.18
1939...	13.46	2.20C	2.80b	64.35f	2.10
1942...	14.17	2.20C	2.80b	85.61f	2.10
1947...	26.38	3.46C	24.34c	115.83g	2.61
1948...	30.33	4.05C	26.32c	114.38g	2.98
1949...	33.00	3.32p	26.80c	98.13g	3.25
1950...	33.50	3.52p	27.10c	131.88g	3.42
1951...	37.92	3.78p	31.00c	154.79g	3.65
1952...	36.45	3.84p	32.00c	155.00g	3.73
1953...	35.33	3.97p	32.00c	156.67g	3.98

•BRICK: wholesale, fob; •CEMENT: net, delivered R Rosendale, rest Portland C in cloth bags delivered (1949–$4.23) price of bags included, p in paper bags, fob city in carload lots; •LIME: a common lump, wholesale, fob, 180 lb., net, b 280 lb., c common hydrated, delivered, per ton (40 bags of 50 lb. ea) no longer quoted per bbl.; •LUMBER: No. 1 common, rough, d 1-in. yellow pine, wholesale at dock, e 3-in. LLYP, f 3x12 LLYP from Lumber Trade Jl., g 3x12 SLYP (LLYP out of market); •STEEL: h fob Pittsburgh.

Materials prices keep climbing. During 1953 cement went up almost 5%, structural steel 6.5%, sand 3.9%, brick 4.1%, ready-mix concrete, 5.2% and structural clay tile 3.5%. But lumber was down 6.8% for fir, 2.3% for pine. By September, 1954, the 12-month rises were: cement, 3.9%; structural steel, 3.7%; sand, 3.1%; fir, 11.1%; pine, 1.5%; brick, 1.4%; ready-mix concrete, 2.2%; and structural clay tile, 1.5%.

Wholesale price index, building materials

Bureau of Labor Statistics, 1947–49 = 100

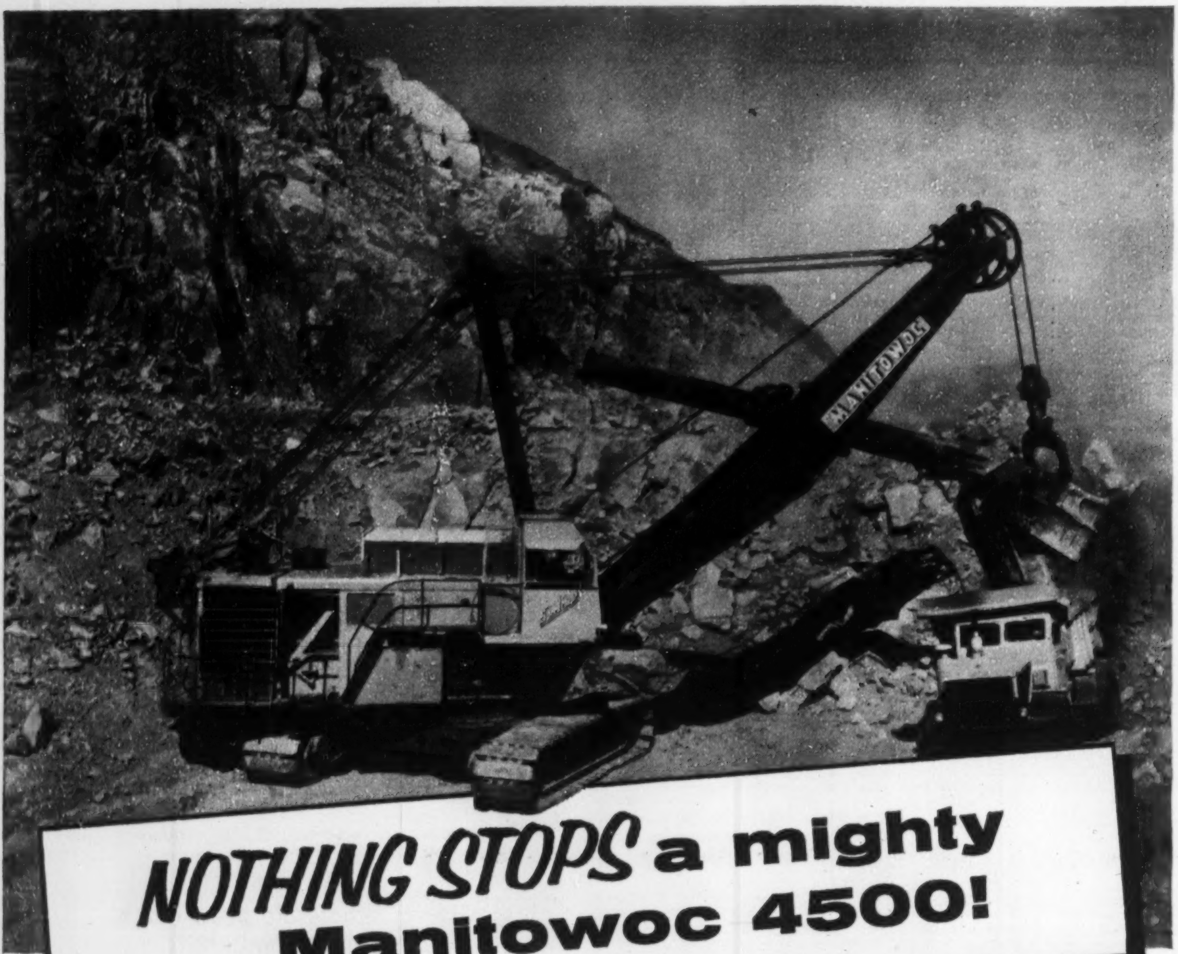
Month	1947	#1948#	1949#	1950#	1951#	1952	1953	1954
Year..	94.0	104.0	102.0	109.5	119.6	118.2	119.9	.....
Jan...	88.7	100.7	105.4	102.1	120.2	117.8	118.4	119.6
Feb...	89.9	101.2	104.9	103.2	120.7	117.9	118.7	119.2
Mar...	91.5	101.8	104.4	104.1	120.8	118.0	119.2	119.3
Apr...	92.8	102.0	103.4	104.7	120.9	118.2	119.9	119.0
May...	93.0	102.5	102.4	106.3	120.7	118.1	120.2	118.6
June..	92.8	103.1	101.5	107.5	120.0	117.8	120.5	118.5
July...	93.4	104.5	100.3	109.1	119.4	118.0	121.3	120.5
Aug...	94.9	106.7	99.7	112.0	118.9	118.6	120.8	120.8p
Sept...	96.2	107.0	99.9	114.4	118.7	118.7	120.4	.....
Oct...	97.1	106.6	100.2	115.8	118.7	118.6	120.0	.....
Nov...	98.3	106.3	100.6	116.3	118.5	118.4	119.5	.....
Dec...	99.2	105.9	101.2	118.3	118.0	118.3	119.6	.....

Official beginning January, 1952 # Unofficial—for official Index for these years see the 1926 = 100 wholesale price index discontinued by BLS 1952 p preliminary

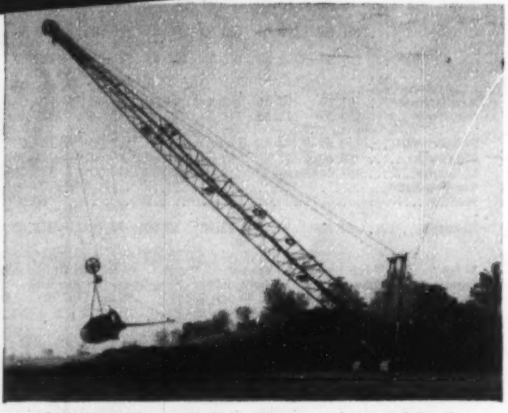
Major items included in BLS building materials price index—1947–49=100

Major items	Weight %	August 15 1947	1948	1949	1950	1952	1953	1954
All building materials	100.0	94.9	106.7	99.7	112.0	118.6	120.8	120.8
Lumber & wood products	38.6	.....	.....	.....	.....	.....	.....	.....
Douglas fir	8.2	99.2	113.8	92.0	133.0	128.3	115.5	124.5
Southern pine	9.3	95.2	105.9	92.1	114.3	117.0	115.0	111.5
Other softwoods	7.1	91.0	111.7	103.2	124.6	129.7	134.8	130.2
Hardwood	6.3	96.0	108.7	90.8	117.3	110.9	115.8	112.1
Millwork	5.9	87.6	108.1	107.2	113.0	127.2	131.7	130.1
Softwood plywood	1.3	88.3	119.7	90.6	116.7	112.9	115.4	114.7
Hardwood plywood	0.5	96.1	105.8	92.9	106.1	101.1	110.9	98.8
Non-metal minerals	19.2	.....	.....	.....	.....	.....	.....	.....
Concrete ingredients	6.3	94.0	103.3	105.0	106.2	112.9	118.6	122.2
Portland cement	3.0	92.6	104.8	105.2	107.1	116.4	123.8	128.3
Concrete products	3.1	95.5	102.2	103.9	105.1	112.4	116.1	118.1
Prep. asph. roofing	3.1	94.4	103.6	102.6	100.5	106.0	105.8	98.6
Struct. clay products	2.5	93.9	104.2	105.2	112.3	121.3	131.3	132.1
Gypsum products	1.2	92.5	104.1	102.3	104.7	117.7	122.1	122.1
Other	3.0	not available						
Insulation matl	na	97.4	103.5	99.1	102.3	105.1	107.8	110.1

Major items	Weight %	August 15 1947	1948	1949	1950	1952	1953	1954
Metals & Metal products	29.5	.....	.....	.....	.....	.....	.....	.....
Structural shapes	1.4	89.9	112.4	112.4	120.4	134.9	141.9	146.2
Metal doors, sash trim	3.3	97.2	102.8	102.8	107.3	117.7	127.3	131.4
Heating equipment	9.5	95.0	102.7	102.5	105.4	113.7	115.4	114.0
Plumbing equipment	3.4	94.8	104.9	102.2	109.5	118.1	118.7	118.5
Other	11.9	not available						
Hardware (finished)	na	97.9	105.1	101.9	112.8	122.3	133.4	138.5
Paint & paint materials	6.8	97.0	100.9	96.5	96.9	106.9	106.3	108.3
Prepared paints	6.5	98.7	100.6	98.0	99.5	110.6	110.7	112.8
Paint materials	0.3	93.3	101.7	93.1	90.8	98.1	96.0	97.8
Machinery & motive prod	2.9	.....	.....	.....	.....	.....	.....	.....
Elevators, escalators	0.8	95.6	100.0	105.2	104.9	114.1	116.2	118.0
Fans, blowers	0.4	88.7	104.5	113.7	122.1	136.7	141.9	143.7
Incandescent lamps	1.7	95.9	104.6	104.6	104.6	117.9	136.9	136.9
Bldg. paper & board	1.6	91.8	105.5	103.8	108.6	115.8	123.0	127.9
Miscellaneous	1.4	not available						



NOTHING STOPS a mighty Manitowoc 4500!



4500 Dragline with 140′ boom and 5 yard bucket building levee near Chester, Illinois.

Not even this solid mass of rugged rock can stop a powerful Manitowoc 4500! Yard after yard — load after load — this mighty of the mightiest keeps right on smashing out a broad path for a railroad near Cheyenne, Wyoming.

It can't be beat as a shovel — handles up to 5½ yards of rock like a handful of peanuts. Single, free-turning tubular stick rolls through saddle and makes digging shocks harmless. Complete diesel operation permits traveling anywhere without a trailing cable or electric supply.

It can't be beat as a dragline — it's "steady as she goes", with a low center of gravity; wide, long crawlers — providing maximum stability for long reaching booms — features that mean full capacity buckets on every dragline job.

The 4500 main machinery is simple, powerful and fast, with only 15 gears and 8 sprockets -- no lost motion — less maintenance and easy to service. All these advantages, plus the added power and performance of Manitowoc Torque Converter application.

See and get the facts on Manitowoc before you buy your next shovel or dragline.

MANITOWOC

SHOVELS 1-5 YD. · Speedcrane · CRANES 18-100 TON

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents
November Materials, and Labor Prices will appear in November 4, 1954 issue

CEMENT, AGGREGATE, READY-MIXED CONCRETE—F. O. B. CITY

	PORTLAND CEMENT* Per bbl. C/L lots cash, dis. not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8 x 8 x 16-in.; truckload del.; per block		CONCRETE Ready Mixed 1:2:4: over.
	Paper	Bulk	Mortar	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand grav.	Lt. wgt. agg.	50 c.y., del.
Atlanta	$3.87	$3.56	$3.40	$2.075	$2.075	$1.83	$2.20	$2.20	$1.99	$1.99	$0.21	$0.21	$12.06
Baltimore	3.90	3.60	3.53	2.60‡a	2.60‡a	2.00‡a	2.75‡a	2.80‡a	2.65‡a	2.60‡a	.17	.17a	11.45
Birmingham	3.62	2.75e	....	2.53n	2.53n	2.08n	2.75	2.75	1.35	1.45	.165	.165	11.00
Boston	4.22	3.91	3.96	2.50a	2.50a	2.50a	1.50a	1.60a	.....	.....	.215	.245a	12.50h
Chicago	3.63	3.32	3.35	3.25‡b	3.25‡b	3.65‡b	3.25‡b	3.25‡b	2.25‡	2.25‡	.23	.23b	12.00
Cincinnati	3.85	3.55	3.63	2.19‡c	2.24‡c	2.24‡c	2.54‡c	2.54‡c	.....	.....	.205	.225a	10.95
Cleveland	N. A. in C. L.	3.19e	....	2.05f	1.85f	1.65	4.10a	4.10a	3.35‡	3.15‡	......	.22	14.40d
Dallas	3.15	2.85	2.90	2.18	2.28	1.84	2.22	2.38	.....	.....	.11e	.2675	9.40
Denver	4.24	3.94	4.24	1.85	2.00	1.20	....	....	.....	.....	.23	.255a	10.50
Detroit	3.72	3.17	3.50	4.50‡b	4.50‡b	4.00‡b	3.75‡	3.75‡	4.25‡	4.25‡	.21	.21a	12.70f
Kansas City	3.67	3.47	3.30	1.85‡	1.85‡	1.50‡a	2.00‡a	2.00‡a	.....	.....	.22a	.24c	12.50b‡
Los Angeles	4.72a	4.26a	5.20	2.21a	2.41a	2.21a	2.16a	2.26a	.....	.....	.135fm	.245m	11.88hk
Minneapolis	4.10h	3.79h	3.71	2.70‡ag	2.70‡ag	1.60‡ag	3.25‡ag	3.25‡ag	.....	.....	.19i	......	12.75n
Montreal	3.16ac	2.96ac	....	3.00o	3.00o	2.25	1.65ij	1.90ij	.....	.....	.20	.20a	10.55ab
New Orleans	3.50	3.17	3.48	2.44	2.44	2.00	....	....	1.05	1.25	.275	......	12.90
New York	4.01	3.70	3.53	2.85bk	2.85bk	1.90bk	2.70bl	2.70bl	.....	.....	......	......	14.05an
Philadelphia	3.58/3.97‡	3.27/3.64‡	3.58/3.63‡	2.75‡op	2.75‡op	2.15‡op	2.30‡	2.40‡	2.00	1.90	.22/.25	......	12.50ao
Pittsburgh	3.62	3.34	3.62	2.25‡	2.25‡	2.20‡	2.60‡	2.60‡	2.15	2.15	.22d	.28	13.00
St. Louis	3.55/3.78b	3.25/3.51b	3.40/3.57	3.10am	2.90am	2.30/2.90am	1.60j	1.70j	1.50	1.50	.22	.28ci	11.90
San Francisco	3.67	3.27	....	2.07	2.07	2.17	2.22	2.22	.....	.....	......	.28cl	12.15e
Seattle	4.80a	3.55a	5.95h	3.50‡bm	3.50‡bm	3.50‡bm	4.00‡bm	4.00‡bm	.....	.....	.25i	.3325i	12.30i

‡ Delivered. * Prices incl. dealers discount except as noted.
CEMENT: *a* Subj. to 10¢ dis. *b* Less 2% for cash. *c* CL price dealers discount not incl. *e* Truckload lots, destination price. *h* LCL.
SAND GRAVEL, STONE & SLAG: *a* Truck lots. *b* Per cu. yd. *c* 5 tons or more. *e* ½". *f* Pea gravel. *g* Less 5% for cash. *h* Less than 5 tons. *i* Sales tax incl. *j* F.o.b. quarry. *k* Barge lots asd. *l* F.o.b. scow Hudson river. *m* Less 2% for cash. *n* F.o.b. cars. *o* 1-3 mi zone. *p* Add 10¢ for ea. add'l mi zone.

CONCRETE BLOCK: *a* Cinder. *b* Waylite. *c* Haydite. *d* Celocrete *e* 5¼ x 8 x 12 in. *f* 8 x 4 x 16. *g* F.o.b. truck at job. *i* Less 2% for cash *j* Less 1% for cash. *l* F.o.b. plant San Rafael. *m* F.o.b. yard
READY MIXED CONCRETE: *a* 5 cu. yds. or over del. Man. *b* 25 cu. yds. or more. *c* 10–100 cy. brackets. *d* 1–3 mi. zone. *e* 2,000 lb comp. *f* 2500 lb. comp. *h* Less 50¢ for cash. *i* 5% off for cash. *j* 2% off for cash. *k* Sales tax included. *l* 1:2½:4. *m* F.o.b. yard. *n* Plus escalator clause. o Add 15¢ for ea. add'l 3-mi zone.

CASH DISCOUNTS CEMENT to Contractors: Truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10¢ per bbl. for payment within 15 days of date of invoice. Subject discount 10¢ per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES AT CEMENT MILLS

Charge for bags not included. For paper bags add 30¢ per bbl., not refundable.

	Bulk		Bulk		Bulk		Bulk		Bulk
Richard City, Tenn	$2.90†	Buffington, Ind	$2.85†	Steelton, Minn	$2.95†	Muskegon, Mich	$3.00†	Toledo, O	$2.90†
Clinchfield, Ga	2.90†	Independence, Kan	2.80†	Leeds, Ala	2.75†	Saginaw, Mich	2.90†	Milwaukee, Wis	3.05†
Kingsport, Tenn	2.90†	Hannibal, Mo	2.85†	Duluth, Minn	2.95†	Wyandotte, Mich	2.90†	Green Bay, Wis	3.05†
West Des Moines, Iowa	2.95†	Northampton, Pa	2.75†	Hudson, N. Y	2.75†	Buffalo, N. Y	2.85†	Ironton, O	2.90†
Nazareth, Pa	2.75†	Universal, Pa	2.95†	Alpena, Mich	2.80†	Oswego, N. Y	3.00†	Montreal City	2.66
Bath, Pa	2.75†	Waco, Tex. (+ 10¢ tax)	2.60†	Detroit, Mich	2.90†	Cleveland, O	2.90†	W. Winfield, Pa	2.95†

† *Prices to hold for fourth quarter of* 1954.

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F. O. B. CITY

	PAVING BRICK AND BLOCK			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration		CUTBACK ASPHALT MC Per ton		ROAD OIL	ASPHALT EMULSION RSI Per gal.	
	Granite Per M lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Per gal. Tank car	Tank car	Drums
Atlanta	$82.00	$41.00	$2.25	$26.00	$33.25	$0.215	$0.455	$0.095w	$0.185w	$0.105	$0.115	$0.225
Baltimore	150.00‡	75.00‡	.....	21.00i	.....	.0851i	0.175i	.09iwE	.18iwE	.09i	.095i	0.185i
Birmingham	.....	49.50i	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Boston	.....	.....	.....	22.00a	23.00a	22.00av	22.00av	.09F	.....	.09a	.10aG	.22aG
Chicago	155.00‡	85.00‡	3.45/3.65‡j	19.85b	29.85b	18.85bv	28.85bv	.094bwH	.1740bwH	.0725b	.....	.....
Cincinnati	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Cleveland	200.00	70.00d	5.03g	23.00	.....	23.00A	.....	.1025AwF	.....	.....	.1025AG	.18AG
Dallas	e	40.00	e	24.05	43.09	.1016	.2103	28.91	50.44	.098	.1087	1960
Denver	.....	50.00	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Detroit	.....	98.00	.....	27.21	.....	27.21v	.....	.1188wI	.....	.0792	.....	.211
Kansas City	e	e	e	15.00cl	.....	15.00v	.....	.065vwJ	.....	.055c	0.10	.....
Los Angeles	e	.....	e	16.00dmx	.....	16.00dvx	.....	18.00dxK	.....	17.00dv	.0825j	.1725j
Minneapolis	.....	.....	2.97h	.....	.....	.....	.....	.....	.....	.....	.....	.....
Montreal	.....	e	e	27.00n	39.60n	.135n	.198n	16.50nu	20.90nu	.132n	.197ns	.239ns
New Orleans	.....	.....	.....	17.50e	....o	17.50ev	....o	.085ew	....o	.0825B	.0825BL	.....
New York	.....	.....	2.75f	23.89qCD	44.32qD	22.89vtCD	43.57vtD	.1023vCDF	.1880wDF	.....	.1023CD	.1918D
Philadelphia	175.00	110.00	4.06	22.00	.....	.....	.....	.09uF	.....	.....	.....	.....
Pittsburgh	165.00	48.00	4.60	27.00	38.00	.10	.21	27.00E	40.00E	.098	.11	.224
St. Louis	.....	.....	.....	18.55f	.....	.1713	.....	.0865wM	.....	0.155	.10	.....
San Francisco	.....	55.00a	.....	17.50g	33.00gp	17.50gkv	33.00gkv	20.00gN	37.50gN	18.75v	.085y	.....
Seattle	.....	.....	.....	17.50h	38.00h	17.25hv	.....	24.50K	.....	19.75hv	.085h	.095hv

‡ Delivered.
PAVING BRICK & BLOCK: *a* CL. *c* 2¾ x 8¼ x 4. *d* LCL, truck deliveries. *e* Not used. *f* 2" interior 6# treat. *g* 3" *h* 2" int., 8# treat. *i* 3 x 3⅝ x 8½. *j* 2½", 6lb. tr.
ASPHALTS: *a* Price at plant, Everett, Mass. *b* F.o.b. refinery Lockport, Ill. *c* F.o.b. Sugar Creek, Mo. *d* F.o.b. refinery, El Segunda. *e* F.o.b. Baton Rouge. F.o.b. Wood River or Roxana, Ill. *g* F.o.b. Richmond, Calif. *h* F.o.b. Martinez. *i* F.o.b. refinery, Baltimore. *j* F.o.b. refinery, Inglewood, Calif. *k* 50–110 penetr. *l* Less than 100 penetr. *m* 40/80 penetr. *n* Tax incl. *o* Drums not avail. Shipped in steel bbl. *q* 40/85 penetr. *r* In customer's drums. *s* Shipped in drums, per drum. *t* 85/200 penetr. *u* Per 100 gal. *v* Per ton. *w* Per gal. *x* Also tank trucks *y* F.o.b. Oakland. A F.o.b. refinery, Cleveland. B F.o.b. Destrehan, La. C Bulk. D Prices based on transporting to Manhattan via truck. E RC. F Also RC. G Also MS, SS. H RC O -5 incl. I MC 4. J MC, RC .0675. K MC 3, 4 & 5. L MS. M MC 1-5, RC 1-5, .089. N MC 3.

IRON AND STEEL PRODUCTS—PER 100 LBS. BASE MILL PRICES

	STRUCT SHAPES	PLATE CARBON STEEL	REINF BARS billet	RIVETS ½-in. structural	SHEET PILING Base	STEEL RAILS Per Net Ton Standard	STEEL RAILS Light	STEEL RAILS Re-rolled	TRACK SUPPLIES Angle Bars	Std Spikes	Tie Plates	Track Bolts
Birmingham Area	$4.25	$4.225	$4.30	$8.90	....	$89.00	$107.00	Not available	$5.425	$7.30	$5.275	....
Chicago Area	4.25	4.225	4.30	8.90	$5.075	89.00	107.00		5.425	7.30	5.275	....
Pittsburgh Area	4.25	4.225	4.30	8.90	5.075	89.00	107.00		5.425	7.30	5.275	$11.00
Buffalo Area	4.25	4.225	4.30	8.90	5.075	89.00	107.00	....	5.425	7.30	5.275	11.00
Cleveland	....	....	4.30	8.90	5.075	......	......	....	....	....	....	11.00
Youngstown Area	....	....	4.30	....	....	......	......	....	....	7.30	....	....
Geneva	4.25	4.225	....	....	....	......	......	....	....	....	....	....
Los Angeles	....	....	....	....	5.075	......	......	....	....	7.30	....	....
Pueblo	4.30	4.70	4.75	....	....	......	95.00	....	5.425	7.30	5.275	11.00

IRON AND STEEL PRODUCTS—F. O. B. WAREHOUSE, PER 100 LBS., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS Per 100 lb., base price 5 tons to carload lot New billet	Rail steel	EXPANDED METAL LATH*k* Per 100 sq. yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.
Atlanta	$7.31	$7.11s	$7.11s	$38.00‡	$42.00‡
Baltimore	7.02	7.06j	....	42.00	45.00
Birmingham	6.35	6.15t	6.15t	51.00p	57.00p
Boston	7.59a	7.37	7.37	40.50	44.50
Chicago	6.69	5.78gu	5.78gu	46.00‡	56.00‡
Cincinnati	7.06ak	7.06rv	....	40.50mo	44.50mo
Cleveland	7.02	5.76c	....	39.00‡	43.00‡
Dallas	9.05	7.25	7.25	49.00	52.00
Denver	8.15	7.20c	....	48.00m	59.00m
Detroit	7.16	6.39dw	....	50.50	60.50
Kansas City	7.36a	7.57	....	45.00	50.50
Los Angeles	7.55fd	7.05	....	52.00	58.00
Minneapolis	7.15d	7.68b	7.68b	37.00	41.00
Montreal	7.25–8.00i^{C}/8.50–9.20^{A}	6.05i	6.05i	46.00^{A}	51.00^{A}
New Orleans	....	6.20akz	....	66.00	60.00
New York	7.48	6.85yaa	6.85yaa	42.00mo	48.00mo
Philadelphia	6.42	6.67	....	38.00‡	42.00‡
Pittsburgh	6.55	6.55z	6.55	37.60	39.60
St. Louis	7.09a	6.30c	6.30c	55.00l	56.00l
San Francisco	7.50	6.85j	....	41.50	47.50
Seattle	5.00e	6.55cj	....	53.50mr	59.50mr

Quantity extras, per cwt: under 100#, +$4; 100–399#, +$2; 400–999#, +85¢; 1000–1999#, +20¢; 2000–9999#, base price; 10,000–19,999#, −20¢; 20,000–39,999#, −40¢; 40,000# and up, −50¢

EXTRAS, per cwt—*Quantity: less than 700#, +50¢: 700–1499#, +25¢; 1500–7999#, +10¢ *Size†: #2 +$2.20; #3 +$1.10; #4 +80¢; #5 +62.5¢; #6, #7 +45¢; #8, #9, #10 +30¢ *Bending: heavy, +80¢; light, +$2 (except in New York City and surrounding metropolitan area where bending must be done on the job) *Engineering (details and placing from designs by others): over 500 tons, +45¢; 200–500 tons, +50¢ but not over $4500; 20–200 tons, +60¢ but not over $2000; 5–20 tons, +70¢ but not over $240; under 5 tons, +85¢ but not over $70 *Design only: +60¢

WELDED FABRIC REINFORCING
Per 100 sq. ft., carload lots fob mill

4 × 16 in., No. 5 & 10 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. **$3.18**

4 × 12 in., No. 8 & 12 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. **$2.08**

6 × 6 in., No. 6 & 6 wires—
Joliet, Ill., Donora, Pa., Monessen, Pa. **$3.33**

*‡ Delivered *a 2000–9999# *b 10,000–15,999#, fob city *c 20 tons or over *d 10,000–19,999# *e fob plant *f incl. delivering in free zone *g CL *h list price; dominion tax exempt; add provincial and municipal taxes *i add dominion, provincial and municipal sales taxes *j intermediate and hard grade *k fob city *l delivered; contractor to do unloading *m copper alloy *n LCL *o asphalt coated *p del. of 500 sq. yd. or more *q 4# per sq. yd. *r 2% off for cash *s add 2.5¢ switch *t add 5¢ switch, 15¢ del. *u add 6.25¢ switch *v add 15¢ del. *w add 20¢ del. *x add 5¢ switch *y add 30¢ del. *z add 10¢ del. *aa Dropping of listing charges causes decline this month. Prices beginning Aug. 1 based on Morrisville, Pa.; previously based on Sparrow Pt., Md. Decrease in freight costs due to switch in mill base offset mill price rise July '54. *A American made *C Canadian made
† Number system replaces inch system of classifying bar sizes. New system is based on number of eighth inches in diameter of bar.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	ASBESTOS CEMENT PIPE per lin. ft. f.o.b. city 6" Pr Cl. 150	12" Sew Cl. I	VITRIFIED SEWER PIPE Per foot, Delivered ASTM C13-44T std. 8 in. s.s.	std. 12 in. s.s.	24 in. ds.	36 in. ds.	CLAY DRAIN TILE ASTM C4-24 Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered: ASTMC 14-41 12 in.	24 in.
Atlanta	$101.00	$1.45	$2.42	$ .545	$1.27	$4.82	$12.925	$248.00	$356.00	$0.90m	$3.40m
Baltimore	121.50	1.45	2.42	.546	1.053	4.275s	11.3775	178.20	274.80	.95	2.60
Birmingham	108.00	1.45	2.42	.42	.75	2.99	....	250.00‡	375.00‡	1.25m	2.75m
Boston	122.00	1.47	2.20	.581qrt	1.1205qrt	4.635qrt	12.1975qrt	187.80r	289.20r	1.62mg	3.95mg
Chicago	107.00	1.45	2.20	.70m	1.35m	5.62m	13.50m	150.00‡	270.00‡	.80	2.80
Cincinnati	106.00	1.47	2.20	.581t	1.120t	4.64t	12.20t	225.00	350.00	.80m	2.95m
Cleveland	108.00	1.47	2.29	.49s	.945s	3.96s	10.66s	158.00m	245.65m	.85m	3.25m
Dallas	112.00	1.47	2.54	.439	.790	4.00b	9.17b	......	......	.49	1.60
Denver	115.00	1.53	2.54	.45n	.78n	3.48n	....	......	......	.74m	2.50m
Detroit	108.00	1.47	2.29	.75	1.45	5.75	15.50	230.00m	350.00m	.86	3.47
Kansas City	113.00	1.47	2.29	.53	.945	3.87	10.60	250.00	480.00	.80	3.25g
Los Angeles	120.65	1.53	2.29	.67l	1.46l	5.97l	14.89l	228.20l	348.90l	.95	2.75f
Minneapolis w	112.00	1.40	2.42	.75mo	1.36mo	5.60mo	....	......	......	1.42h	4.05h
Montreal	110.00	....	....	1.07u	1.73u	5.52u	8.93u	......	......	1.17h	3.11j
New Orleans	101.50	1.45	2.42	.48	.875	4.69	....	280.00p	460.00p	.65	2.20
New York	111.35	1.47	2.20	.66	1.28	5.08	13.42	......	......	1.15	3.00
Philadelphia	110.00	1.45	2.20	.65	1.25	4.95s	12.65s	300.00‡	350.00‡	1.60h	3.95h
Pittsburgh	110.00	1.47	2.20	.468m	.864m	3.86m	9.78m	152.00	244.00	1.05h	2.50h
St. Louis	112.00	1.45	2.29	.56	1.03	4.22	9.80	180.00l	380.00l	1.20l	2.70l
San Francisco	127.00	1.53	2.29	.61d	1.41d	5.78d	14.32d	235.00l	392.00l	1.05m	3.30n
Seattle	122.00	1.54	2.42	.51b	.91b	....	....	150.00c	......	.85k	2.75k

***WROUGHT STEEL PIPE**
(Full standard weight)
Discount from list; see footnote

Mill	2½ & 3 in., Butt Weld† Black %	2½ & 3 in., Butt Weld† Galv. %	3½ to 6 in., Lap Weld† Black %	3½ to 6 in., Lap Weld† Galv. %
Lorain, Ohio	34.25	17.00	....	....
Aliquippa, Pa.	34.25	17.00	22.50a	10.25a
Sparrows Pt., Md.	32.25	14.50	20.50a	2.75
Benwood, W. Va.	34.25	17.00	24.25c	6.50c
Youngstown, O.	34.25	17.00	....	....
Indiana Harbor, Ind.	33.25	16.00	24.50ab	6.75a
Sharon, Pa.	34.25	17.00	....	....
Wheatland, Pa.	34.25	17.00	25.50a	7.75a
Etna, Pa.	34.25b	17.00	24.25d	10.00d
Fontana, Calif.	21.25b	4.00b	12.50ab	+5.25ab

† Threaded and coupled. *a* 3½ to 4 in. *b* Continuous weld. *c* 5 and 6 in. *d* 6 in.

*‡ Delivered *a Class B & heavier. Based on existing freight rates; subject to rate change. Gas pipe and class A, $5 per ton additional. 4 in., $7 per ton additional. 30 in. and larger, usually, $1 per ton less. *b Extra strength ASTM C 200-44T *c 4-in., $90 *d SS361-A *e 30-in. *f 21 in. *g culvert pipe; reinforced, ASTM C 76-41 *h reinforced, ASTM C 75-41 *i reinforced, ASTM C 76-37 *j centrispun; no standard specs. in Canada *k 2% off for cash *l fob plant *m truck delivery *n LCL delivered, ob truck *o listed price based on LCL (no min.) *p freight allowed to destination in city *q ASTM C 13-40 *r CL fob origin, freight allowed *s 2 ft lengths *t 3 ft lengths *u CESA A 60-1941 specs. used *v standard strength *w 6 in., $1.67 per ft., Class 150, CL, fob track

* WROUGHT STEEL PIPE: Deduct discounts shown above from the following standard list consumers carload prices to get mill price. List prices per ft. (based on approx. $200 per net ton): *Butt Weld* ⅛ in., 5½¢; ¼ in., 6¢; ⅜ in., 6¢; ½ in., 8½¢; ¾ in., 11½¢; 1 in., 17¢; 1¼ in., 23¢; 1½ in., 27½¢; 2 in., 37¢; 2½ in., 58½¢; 3 in., 76½¢. *Lap Weld* 3½ in., 92¢; 4 in., $1.09; 5 in., $1.48; 6 in., $1.92. Add freight rates plus 3% transportation tax to get destination price.

WROUGHT IRON PIPE: List prices per ft. same as for wrought steelpipe, but add following "discounts" to get Pittsburgh mill price: *Butt Weld* — 1 in. black, + 32.75, galv. + 61.0; 1¼ in. black, + 32.75, galv. +60.50, 1½ in. black, + 29.25 galv. + 56.75; *Lap Weld* — 2½ in. to 3 in. black + 33.50 galv. + 59.5; 4½ in. to 6 in. black + 30.50 galv. + 54.75. Add freight rates plus 3% transportation tax to get destination price.

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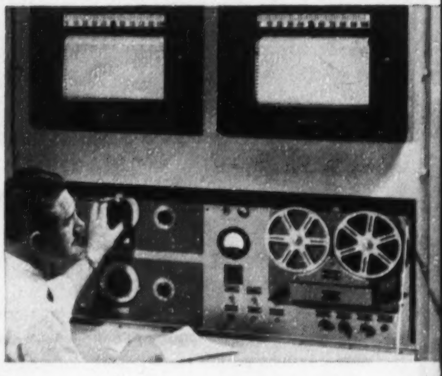
We shock-load, abuse, and torture them. Match every conceivable hauling condition. Then add a few brutal tricks of our own!

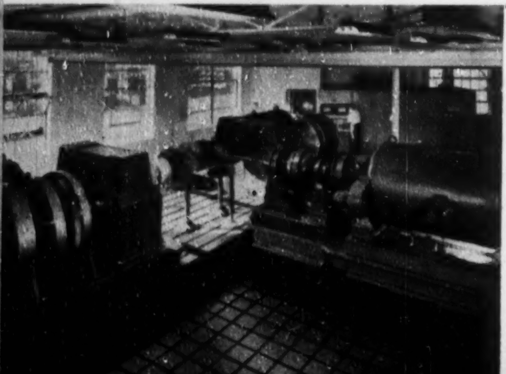
Why? So you'll know in advance, and *for sure,* that a Timken-Detroit axle can take the punishment it was designed for. More rugged, grueling punishment than any other axle made!

To prove it, we capsuled a multi-thousand acre proving ground into one room. Here our engineers can put 50 years of experience in building axles for trucks, buses and trailers to work—subjecting axles and gearing *indoors,* to any *outdoor* operating condition.

Such exacting research pays off for you in: longer axle life; less maintenance, repairs and downtime; reduced operating expenses. This is why Timken-Detroit axles are preferred by manufacturers and operators everywhere.



This is our "truck driver." He works in our "Torture Chamber." Above him are graphs showing speed and torque performance under any operating condition he chooses . . . soft ground at full load . . . mountains . . . express highways or side roads. With special dials, recorders and electronic devices, he actually *drives* the axle with scientific accuracy from his chair!



How TDA proves axle quality in this "Torture Chamber"

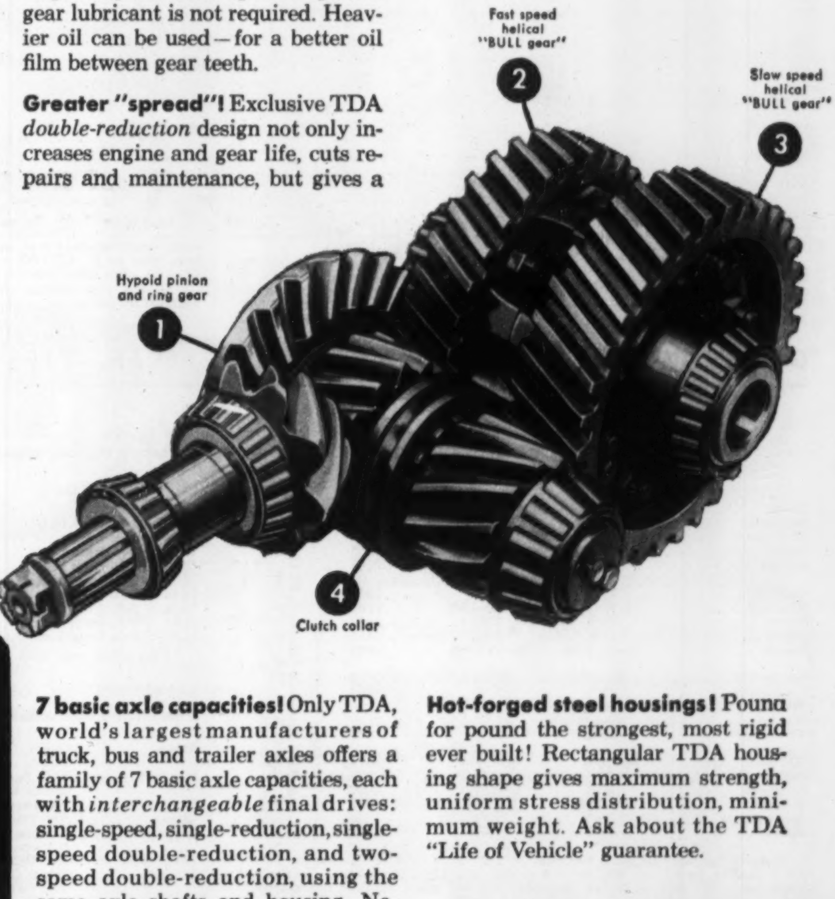
We pick one of our axles at random . . . then duplicate a hauling condition, hour after hour, day after day . . . simulating half a million miles of the toughest driving situations in just a few days. Or "invent" a test like going uphill with a full load from California to New York nonstop. There is no other axle testing like it in the world!

How Timken-Detroit 2-speed axles with man-size gears, operate in any gear ratio ...indefinitely, without overheating!

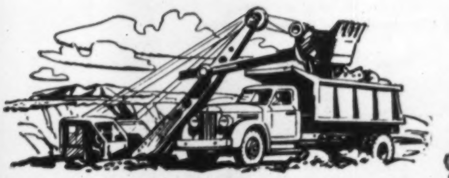
The secret? A husky hypoid ring gear and bigger, stronger pinion set (No. 1 in illustration) provides the *first step* of the total gear reduction for both fast and slow ratios. Two large, heavy-duty helical gear sets provide the *second step.* Both sets are of equal size and capacity—but one set (No. 2) is for fast speed—the other (No. 3) is for slow speed. The clutch collar (No. 4) moves to left or right to engage one "BULL gear" or the other.

The result: Complete elimination of small, complicated parts and midget-size gears! Larger hypoid-helical design gives more teeth in contact—reducing load per unit of contact area—for more positive, quiet operation. Bearings are larger. There's longer motor and truck life because wear on driving parts is less. When you divide the total gear reduction, you double its life expectancy. And the set of "BULL gears" not in use, always idles at greatly reduced speed. Special gear lubricant is not required. Heavier oil can be used—for a better oil film between gear teeth.

Greater "spread"! Exclusive TDA *double-reduction* design not only increases engine and gear life, cuts repairs and maintenance, but gives a vastly greater gear ratio "spread" for all jobs requiring any range of speed or power. A fast gear ratio for light loads everywhere—full loads on the level. Slow speed ratio for full loads on hills—for better pulling in "soft going."


Fast speed helical "BULL gear"
2
Slow speed helical "BULL gear"
3
Hypoid pinion and ring gear
1
4
Clutch collar

death



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WORLD'S LARGEST MANUFACTURERS OF AXLES FOR TRUCKS, BUSES AND TRAILERS

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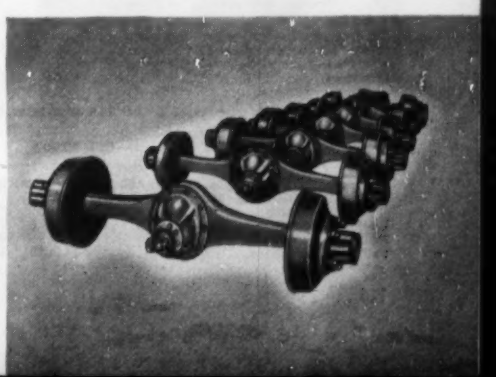
7 basic axle capacities! Only TDA, world's largest manufacturers of truck, bus and trailer axles offers a family of 7 basic axle capacities, each with *interchangeable* final drives: single-speed, single-reduction, single-speed double-reduction, and two-speed double-reduction, using the same axle shafts and housing. Nowhere is there such a selection to fit all special needs.

Exclusive "Torsion-Flow" shafts! Forged so that grain structure of steel conforms to shaft profile, thus assuring uniform distribution of stresses. Exclusive heat-treating formula provides a resilient axle shaft core graduated to a tough, hard outer surface—the ideal combination for axle shaft life. And TDA "Torsion-Flow" shafts are guaranteed for 100,000 miles or 3 years—whichever occurs first.

Hot-forged steel housings! Pound for pound the strongest, most rigid ever built! Rectangular TDA housing shape gives maximum strength, uniform stress distribution, minimum weight. Ask about the TDA "Life of Vehicle" guarantee.



LUMBER, TIMBER, PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

SHORT LEAF YELLOW PINE AND DOUGLAS FIR
All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face)
All Fir boards, dimensions, planks No. 2, Fir small timbers and timbers are No. 1 Lengths up to 20 ft.
(Prices in italics)

LONG LEAF Y. P. Merchantable grade up to 20 ft.

PLYWOOD Rail freight increment (See note for base price)

		1x6 s4s	1x8 s4s	2x4 s4s	2x6 s4s	2x8 s4s	2x10 s4s	3x12 Rgh	6x12 Rgh	12x12 Rgh	LL 2x12 Rgh	LL 12x12 Rgh	Plywood ⅝"	Plywood ¾"
Atlanta	†	**$77.00**	**$80.00**	**$73.50**	**$74.00**	**$77.50**	**$81.00**	**$79.00**	......	......	......	......	$22.32	$27.24
Baltimore	*	**88.00**	**93.00**	**82.00**	**86.00**	**89.00**	**96.00**	**102.00**	......	......	**$160.00**	**$170.00**	25.92	31.60
		120.00g	*120.00g*	*120.00g*	*120.00g*	*120.00g*	*120.00g*	*120.00g*	*$135.00*	*$135.00*				
Birmingham	†	**77.50**	**79.50**	**70.50**	**80.50**	**82.50**	**85.50**	**95.50**	......	......	**115.50**	**155.50**	21.78	26.58
		105.00	*105.00*	*105.00*	*105.00*	*105.00*	*105.00*	*105.00*	*105.00*	*105.00*				
Boston	*	**95/103a**	**100/112a**	**90/102a**	**93/107a**	**100/112a**	**104/114a**	......	......	......	......	......	25.92	31.60
	*	*80.00n*	*80.00n*	*108/110*	*108/110*	*108/110*	*108/110*	*115.00*	*116.00*	*116.00*				
Chicago	**	**98.00**	**101.00**	**88.00**	**105.00**	**112.00**	**115.00**	**110.00**	......	......	**139.00**	**139.00**	22.45	27.37
		108.00	*108.00*	*108/109*	*110.00*	*112.00*	*112/114*	*120.00*	*120.00*	*120.00*				
Cincinnati	*	**86.50**	**92.00**	**77.00**	**85.50**	**92.00**	**104.25**	**107.25**	......	......	**128.00**	**128.00**	25.00	30.48
		96.50	*93.25*	*105.50*	*104.50*	*105.50*	*104.50*	*130.25*	*130.25*	*130.25*				
Cleveland	**	**91.00**	**93.00**	**89.00**	**96.00**	**96.00**	**97.00**	......	......	......	......	......	25.37	30.93
		......	......	*110.00*	*110.00*	*110.00*	*110.00*	*119.50*	*119.50*	*119.50*				
Dallas	k†	**70.00**	**80.00**	**74.00**	**68.00**	**63.00**	**65.00**	**130.00**	......	......	**125.00**	**128.00**	18.72	22.80
Denver	*	*Not in stock*		*118.00*	*118.00*	*118.00*	*119.00*	*125.00*	*135.00*	*140.00*	......	......	13.92	16.98
Detroit	‡	**112.00**	**116.00**	**105.00**	**112.00**	**118.00**	**118.00**	......	......	......	......	......	25.00	30.48
		93.50	*101.50*	*103.50*	*105.25*	*105.25*	*104.75*	*115.50*	*117.00*	*117.00*				
Kansas City	*	**110.00**	**110.00**	**110.00**	**110.00**	**110.00**	......	......	......	......	......	......	16.56	20.16
		122.00	*122.00*	*125.00*	*125.00*	*125.00*	*132.00*	*170.00*	*170.00*	*170.00*				
Los Angeles	[1]	*92.00*	*92.00*	*92.00*	*92.00*	*92.00*	*92.00*	*122.00*	*132.00*	*122.00*	......	......	16.61ab	20.25ab
Minneapolis	♯	*145.00*	*145.00*	*145.00*	*145.00*	*145.00*	*145.00*	*165.00*	*165.00*	*165.00*	......	......	19.89	24.25
Montreal	ab	**88.00**	**97.00**	**88.00**	**88.00**	**100.00**	......	......	......	......	......	......	.....	.....
		110/125	*110/125*	*110/125*	*110/125*	*110/125*	*118.00*	*105.00*	*105.00*	*105.00*				
New Orleans	†	**100.00**	**100.00**	**92.50**	**85.00**	**90.00**	**94.00**	**118.00**	......	......	**150.00**	**148.00**	18.72	22.80
	†	*106.50*	*106.50*	*115/120*	*116.50*	*116.50*	*116.50*	*115.00*	*122.00*	*122.00*				
New York	[2]	**110.00**	**113.00**	**115/118**	**120/125**	**120/125**	**125/130**	**155/165**	......	......	**225.255**	**225/255**	25.92	31.60
				Range from $120.00 to $125.00				*140/155*	*150/160*	*150/160*				
New York 4	**	**80.00**	**82.00**	**69.00**	**81.00**	**84.00**	**85.00**	**115.00**	......	......	**190.00**	**190.00**	.....	.....
		88.00	*89.00*	*95.00*	*94.00*	*95.00*	*95.00*	*106.00*	*115.00*	*115.00*				
Philadelphia	‡		**Range from $110 00 to $127 00**				**110/127**	**110/127**	......	......	**210/220**	**210/220**	25.92	31.60
			Range from $128 00 to $165.00				*125/132*	*135/155*	*150.00*	*150.00*				
Pittsburgh	†		**Range from $95.00 to $100.00**					**120.00**	......	......	**120.00**	**130.00**	25.92	31.60
		120.00	*120.00*	*120.00*	*120.00*	*120.00*	*120.00*	*135.00*	*145.00*	*160.00*				
St. Louis	♯v	**108.50e**	**110.50e**	**105.00d**	**117.00d**	**123/127**	**128/136**	......	......	......	......	......	18.72	22.80
		......	......	*116.00*	*125.00e*	*125.00e*	*127/129*	*172.00e*	*165.00*	*177.00*				
San Francisco	A†	*64.00*	*65.00*	*78/82*	*72.00*	*72.00*	*72.00*	*70.00*	*70.00*	*70.00*	......	......	12.22	14.91a
Seattle	†	*75.00*	*75.00*	*75.00*	*75.00*	*75.00*	*75.00*	*78.00*	*85.00*	*85.00*	......	......	.....	.....

† F.o.b. mill. * F.o.b. city, CL, out of yard. ** F.o.b. city, CL, direct mill shipment. ‡ Deliv. to contr. CL. 1. Retail, LCL, at yard. ♯ Retail, LCL, deliv. 2. Deliv. truck lots. 3. asd. 4. Not avail as we go to press.

LUMBER: **Bold Face type, Southern Pine.** *Italics, Douglas Fir.* *a* Spruce *b* Tax exempt. *c* 5M lots. *d* 8–12 ft. lengths. *e* 8–16 ft. lengths. *g* No. 1 common. *i* 8 ft. lengths. *k* No. 3 common. *n* #3. *A* Rail freight rate from North west mills to San Francisco are $11.50 to $15.00 per M ft bm. From Northern Calif. mills $9.00 by rail, $9.50 by truck. All rates for surfaced stock.

For rough, add $3.00 to above figures.

PLYWOOD: Plyform grade Fir Plywood, 4' by 8' panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ⅝", $171.00; on ¾", $191.00. Exterior plyform ⅝" $190.00, ¾" $212.00. For other centers add rail freight increment from table on proper size Oiling and edge sealing charges included. *a* Lower rate by water shipment *b* 50,000 lb. minimum.

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS Discounts from jobbers list, Feb. 1, 1950a Single or Double Thickness A quality	 B quality	EXPLOSIVES Per lb. 40% Ammonia Gelatin in 50 lb. cases delivered in 200 lb. lots*
Atlanta	79%	80%	$0.2365
Baltimore	78%d	80%d	.2365
Birmingham	83%	83%	.1840
Boston	77–10%	77–10%	.2365
Chicago	76%	76%	.2365
Cincinnati	76%	76%	.2365
Cleveland	76–10–10%	76–10–10%	.2765
Dallas	75%	75%	.2440
Denver	79%	79%	.2415
Detroit	78–10–10%	78–10–10%	.2365
Kansas City	80–10%	80–10%	.2415
Los Angeles	73%	78%	.2390
Minneapolis	75–10%	75–10%	.2415
Montreal	40–5%bc	40–10–5%b	21.35h
New Orleans	78%	79%	.2415
New York	80–10%	80–10%	.3975g
Philadelphia	78%	80%	.2365
Pittsburgh	80%	80%	.2090
St. Louis	80–10%	80–10%	.2415
San Francisco	70%	70%	.2365
Seattle	73%	76%	.2390

Price of 60% Ammonia Gelatin is $0.15 per lb. higher than 40% in U.S.; $1.75 per 100 lbs. higher in Canada.

Glass; a Jobbers' list price per box, 14 x 20, ss, $42.75 for A quality, $37.50 for B quality; 14 x 20, ds, $60.00 for A quality, $52.75 for B quality. *b* Discount from list, Apr. 1951; sales tax included, but 6% tax exemption not allowable for. *c* Single thickness. *d* Discount 6/15/52.

Explosives; * Urban prices influenced by service charges or local storage and delivery regulations do not consistently reflect quantity prices in less congested areas. *g* In borough of Kings, Queens, and Richmond and in Manhattan south of Canal St., add delivery charge of $20.00 per trip. *h* F.o.b. Beloeil (near Montreal), per 100 lb. forcite, 40%. Forcite 60%, $23.10.

40% Ammonia Gelatin price ranges in other than urban areas, per lb.
(except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla. and Me.	$0.184	$0.2165	$0.2365
W. of Miss. to Rocky Mtn. States, Fla. and Maine	.189 – .1965	.2215– .229	.2415– .249
Rocky Mtn. States	.189 – .2015	.2215– .229	.2415– .254
Pacific N. W. States	.1865– .199	.219 – 2315	.239 – .2515
Pacific S. W. States	.184 – .1915	.2165– .219	.2365– .2415

PILES, TIES F.O.B.

PILES

Prices per linear foot, fir and pine, bark off, f.o.b. cars, New York. Fir based on Wash. and Ore. points to New York shipping area; pine based on freight from Norfolk.

Dimensions	Points	Length	By Rail Pine*	 Fir
12-in. at butt	6-in.	30 to 50-ft.	$0.51	....
12-in.— 2-ft. from butt	6-in.	50 to 59-ft.	.54	....
12-in.— 2-ft. from butt	6-in.	60 to 69-ft.	.58	....
12-in.— 2-ft. from butt	6-in.	90 to 100-ft.	....	....
13-in.— 3-ft. from butt	5-in.	91 to 100-ft.	....	....
14-in.— 2-ft. from butt	6-in.	50 to 69-ft.	.50/.68	....
14-in.— 2-ft. from butt	6-in.	70 to 79-ft.	.78/.83	.93
14-in.— 2-ft. from butt	5-in.	80 to 85-ft.	.88/.98	.94
14-in.— 2-ft. from butt	5-in.	85 to 89-ft.	....	1.00
14-in.— 2-ft. from butt	5-in.	90 to 100-ft.	....	1.02

* Pine piling over 80-ft. available only in limited quantities.

RAILWAY TIES

Prices f.o.b. per tie for carload lots;

		6"x8"x8' Untr.	 Tr.	7"x9"x8'6" Untr.	 Tr.
Boston	Oak::i	....	....	....	....
	Pine i	....	....	....	....
New York	S. L. Sap Pine	$2.00	$4.00	$3.00	$5.00
	Mixed Oak	2.50	4.50	3.50	5.50
Birmingham	Hardwood:	2.40	3.88a	2.85	4.58a
Chicago	Red Oak	....	3.20a	....	4.10/4.20a
Los Angeles	Douglas Fir	...	....	....	....
	Redwood:	....	....	....	....
Philadelphia	Red Oak	2.55	3.90	3.45	5.10
St. Louis	White Oak	2.05	....	2.35	..
	Red Oak	1.95	2.55a	2.25	2.90a
	Sap Pine or Cypress	....	2.40a	....	2.75a
San Francisco	Douglas Fir	2.08e f	3.08af	2.73bf	3.93caf
Montreal	Birch or Maple	....h	....h	....h	....h

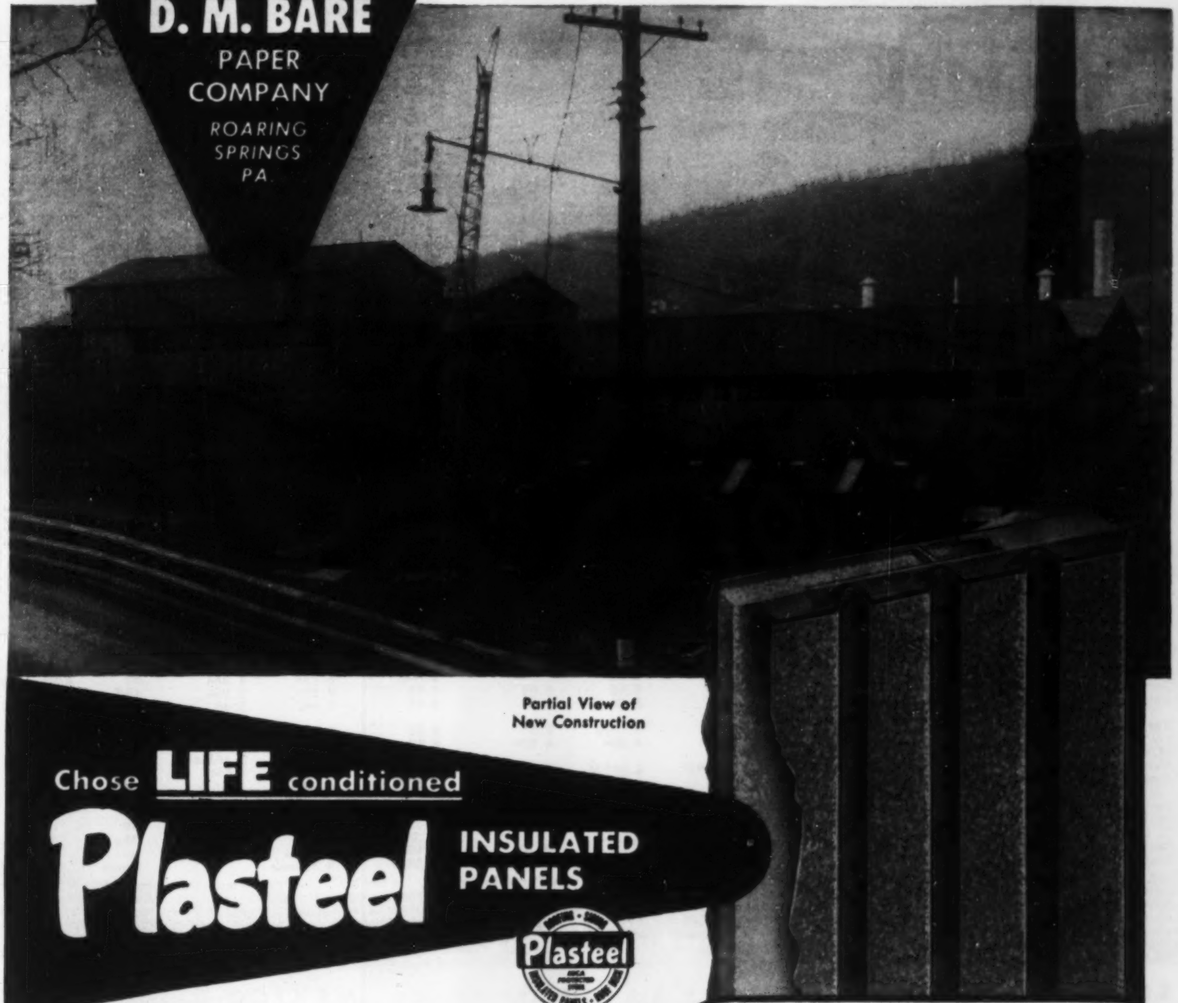
Tr.— Treated; Untr.— Untreated. *a* Creosoted. *b* 7" x 9" x 8'. *c* Empty cell. *e* Green. *f* F.o.b. cars. *h* No constant price available. *i* Not available.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder in drums f.o.b. works, per 100 lb::	$5.02
Chlorine cylinders, liquid, per lb. f.o.b. works	.095
Calcium chloride, 77–80%, flaked, 100-lb. paper bag, f.o.b. works, ton	27.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	2.30
Soda ash, 58%, in paper bags, per 100 lb. dense	1.70
Sulphate of aluminum, commercial, in 100-lb. bags f.o.b. works	1.85
Sulphate of copper, in bags, 99% per 100 lb. f.o.b. works:::	10.35

The
D. M. BARE
PAPER
COMPANY
*ROARING
SPRINGS
PA.*



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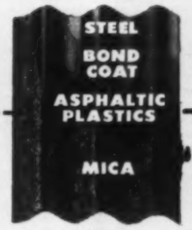

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MAIL THIS COUPON TODAY!

STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity Common backing	Straight hard	LIME Per ton, in paper, Carload lot, Hydrated finishing	Common hydrated	Pulverized, or lump
Atlanta	$195.00	$207.00	$247.00	$327.00	$342.00	$381.00	$27.38	$27.38	$19.00	$17.50	$.....
Baltimore	186.00	198.35	372.00	421.50	549.00	627.00	36.00k	41.00k	32.00	21.50	.....
Birmingham	126.00p	136.00p	......	284.00p	......	......	26.50ff	32.50gg	29.25	24.00	.....
Boston	196.00†	209.00†	392.00†	283.25†	......	......	36.85p	39.85p	30.00†	28.00†	.....
Chicago	136.00	145.00	280.00	......	......	......	26.00	28.00	30.80	26.00	.....
Cincinnati	185.00j	195.00j	260.00jdd	......	......	......	45.00j	46.00j	26.00j	26.00j	.....
Cleveland	170.00**	181.00**	......	......	......	......	34.50	34.50	28.25	28.25	33.00ee
Dallas	......	118.00	......	......	......	......	19.75	32.25	32.00	21.80	.....
Denver	......	......	......	......	......	......	34.00	41.00	34.80bb	28.00bb	34.00bb
Detroit	130.00	138.00	259.00	......	315.00	360.00	37.75cc	38.50cc	34.00	30.00	.....
Kansas City	127.50	147.50	270.00	270.00	340.00	400.00	28.50	.....	32.00	26.00	28.50
Los Angeles	r	r	r	r	r	r	27.50§	.....	34.00	34.00	35.00
Minneapolis	175.00p	196.00p	407.00p	196.00v	......	......	35.00vp	45.00	40.00bbe	30.00bbe	42.00bbde
Montreal	165.00ag	181.00au	325.00au	230.00	248.00s	......	39.50	46.00	34.80	22.00	13.75u
New Orleans	170.00	170.00	310.00	380.00	......	......	31.00	.....	.....	28.00	28.00
New York	147.80h	157.10h	216.00ch	238.10hn	......	......	40.00	.....	36.00	32.00	.....
Philadelphia	145.30	155.00	290.60	348.70	......	......	30/34	35/42	25.00	28.00	2.97
Pittsburgh	138.00	151.00	260.00	228.00	297.00	341.00	36.00	46.00y	25.00	23.00	2.97m
St. Louis	150.00cc	168.50cc	332.50cc	465.00cc	377.50	621.50	40.00sl	38.50s	.90saa	.75saa	1.25aaspez
San Francisco	156.85a*	177.10a*	235.30dda*	......	......	......	37.00	.....	26.60	26.60	2.65m
Seattle	223.00cc	230.00cc	......	240.00ccw	......	......	34.00s	49.00s	42.00shh	37.50	3.90mhh

† F.o.b. yard Roxbury. *a* Smooth. *b* Per 50 lb. bags. *c* 6 x 12 x 12 in.-8 cell. *d* Pulverized hot. *e* 5%, 10th following month. *g* 5¼ x 8 x 12. *h* F.o.b. trucks, job site N.Y.C. *j* Truck load or over. *k* $1.00 discount *l* Red face. *m* Per bbl., 180 lb. *n* 7¾ x 7¾ x 12. Speed title. *p* Truck lots. *q* Provincial and Municipal tax extra. *r* Not used because of earthquake danger. *s* 2% discount for cash. *t* 5¾ x 8 x 11¾. *u* Tax exempt. *v* Sand lime. *w* 5 x 8 x 12. *y* Stacked. *z* Pebble lime price per 80 lb. sack. *aa* Price per sack. Lime not sold per ton. *bb* LCL. *cc* Truck delivery. *dd* 6 x 12 x 12. *ee* Pebble lime. *ff* 80% common. *gg* Select. *hh* LCL. § F.o.b. yard. ** Warehouse delivery. * F.o.b. Stockton.

PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 800-lb. (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb. in 100 lb. cases in oil *w*	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *c*	Ferric Oxide *d*	ROOFING SUPPLIES; Carload lots f.o.b. factory Rolls, slate surfaced, 85-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 300 lb. bbl. per ton
Atlanta	$17.50	$28.275	$3.26	$3.51	$3.01	$2.74	$3.01	$2.98	$0.405	$39.75
Baltimore	17.25	27.90	2.75	4.25	3.35	2.66	4.43	4.43	.47	45.00
Birmingham	17.50	28.275	3.90	3.40	....	2.93	2.93	2.93	....	42.00ee
Boston	17.25	27.90	....	....	....	2.97gg	2.82og	2.82og	.42g	48.50g
Chicago	17.25	27.90	....	....	....	2.91‡u	2.86‡o	2.86‡o	88.00‡bbr	48.00‡
Cincinnati	17.25	27.90	....	....	....	2.50	2.585	2.585	.46y	47.86
Cleveland	17.25	27.90	2.39pgg	2.57gg	2.66gg	2.65q	2.46o	2.46o	.40v	42.70hh
Dallas	17.50	28.65	....	4.05	....	3.50q	3.75o	4.35o	.36	58.50hh
Denver	17.75	28.40	3.29	5.15	3.04	2.65	2.25o	2.35o	.43ff	45.00
Detroit	17.25	27.90	2.35	3.25	2.50	2.65	2.46f	2.46	.50	44.00
Kansas City	17.25	28.65	3.45	3.00ys	2.65	3.32	3.00o	3.00o	.43	57.00
Los Angeles	17.25	28.15	3.30s	4.50s	4.20s	2.90v	1.90ev	l	.64s	l
Minneapolis	17.25	29.88/28.02	....	....	....	2.65idd	2.46hidd	2.46hidd	.44idd	44.00r
Montreal	.....	20.95	2.95Dff	4.05Eff	3.25Fff	4.00t	3.65tf	3.65t	1.06hi	3.30ki
New York	17.25	27.90	....	....	....	2.65#	2.46#o	2.46#o	.44#z	44.00#
Philadelphia	17.25	27.90	3.25	3.65	3.15	2.54	2.94	2.94	.37	26.00
Pittsburgh	17.25	27.90	2.65	2.85	3.15	2.75	2.50o	2.50o	.38	48.00
St. Louis	17.25	27.90	....	....	....	2.50	2.35h	2.38h	.38y	48.45
San Francisco	17.25	28.15	2.40	....	3.40	2.95	4.00aa	....	49	.....
Seattle	17.25	28.40	3.07mce	2.93mce	....	3.58mce	3.05hmce	....	59mce	52.00mce

‡ Delivered. Note: Red lead in oil 50c higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide. *e* 15 lb. *f* Per 432 sq. ft. *g* F.o.b. yard, Roxbury. *h* Per roll. 65 lb. *i* Net carload lot prices; Minneapolis and vicinity. *k* Per cwt. *l* Not used. *m* 1% discount for cash. *n* F.o.b. city. *o* Per 60-lb. *p* 6-drum, 50 gal. ea. *q* Per 90-lb. roll.* *r* F.o.b. factory, Chicago. *s* 466 Med. *t* Federal tax included. *u* Per 90 lb. square. *v* Per ton. *w* Price to large paint contractors is $1.25 less *x* Mineral surfaced. *y* 55-gallon container. *z* Drums. *aa* Approximate cost per 100 lbs. *bb* Roofers coating and cement; Price per ton. *cc* LCL, truck delivery. *dd* 2% cash discount. *ee* Asphalt pitch in 100 lb. package. *ff* 5-gal. drums. *gg* F.o.b. factory. *hh* Incl. freight. *D*. Std Black. *E*. Ready-mixed. *F*. Over 80% ferric oxide. * Aver. wt. approx. 425 to 550 lbs. drum. # Freight allowed to destination not exceeding .50 cwt.

SKILLED AND COMMON WAGE RATES—PER HOUR

	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Electrical Workers	Steamfitters	Common Labor Building	Heavy Const.
Atlanta	$3.10	$2.50	$2.85	$2.60	$2.90	$2.75	$2.90	$1.33	$1.33
Baltimore	3.20d	2.75	3.275j	3.10/3.25	3.075j	2.975	2.975f	1.675i	1.675i
Birmingham	3.25	2.50	2.925h	2.32	2.72	3.00	3.025h	1.375	1.475
Boston	3.185e	2.75	3.275j	3.20	3.30f	3.13R	3.10d	2.14Y	2.14Y
Chicago	3.55k	3.30r	3.35m	3.15w	3.625v	3.53f	3.39s	2.50h	2.50h
Cincinnati	3.325	3.075	3.115h	2.85/3.10	3.10	3.28N	3.335V	2.12	2.02
Cleveland	3.325i	3.275♯	3.275j	3.275	3.175	3.275	3.28s	2.525	2.525
Dallas	3.50	2.75	2.875	2.75	3.437	3.00	3.00	1.45	1.45
Denver	3.50	2.85	2.85	2.78	3.30	3.00	3.05	1.875	1.875
Detroit	3.45ve	3.21v X	3.33s	3.20t	3.49dl	3.52H	3.125h	2.45s	2.45s
Kansas City	3.625	2.75	2.90	2.725/2.97	3.25	2.987O	3.075h	2.03	2.03
Los Angeles	3.40	2.825m	3.175h	2.72d	3.56B	3.20	3.35s	2.15i	2.15i
Minneapolis	3.225	2.80	2.97	2.75	3.00	3.15n	3.00	2.05	2.05
New Orleans	3.10	2.47	2.85m	2.65	2.675	3.00h	3.00s	1.425	1.425
New York	4.15br	3.57bJ	3.975p	3.84J	4.15A	3.63asF	3.815bL	2.415J	2.415J
Philadelphia	3.02i	3.20	3.63JM	2.975/3.72i	3.625S	3.65cw	3.615g	1.95	2.25
Pittsburgh	3.625h	3.20h	3.225h	3.35h	3.30h	3.50	3.375h	2.10h	2.10h
St. Louis	3.62c	3.125h	3.10h	3.125h	3.25h	3.50c	3.39R	2.175h	2.175h
San Francisco	3.65be	2.98h	3.175hw	2.835e	3.50ah	3.30 U	3.35K	2.15h	2.15h
Seattle	3.40d	2.75d	2.95d	2.78	3.25d	3.06 X	3.26T	2.35d	2.35d
Montreal*†	2.00	1.80	1.90	1.70	2.00	1.90	1.90	1.23	1.40

* Cost of living bonus now included in basic wage. ♯ Includes 5¢/hr tool replacement. † Plus 2% vacation pay.

a 6 hr. day. *b* 7 hr. day. *c* Incl. 3% vac. stamp fund plus 7½¢ WF for bricklayers; 4% VF for electricians plus 8¢ WF, 1% PF *d* Incl. 10¢ H&WF. *e* Incl. 10¢ VF. *f* Incl. 6% WF. *g* Incl. 11½¢ WF *h* $2.725 homes & housing plus 7½¢ WF. *i* Incl. 17¢ WF *j* Incl. 10½¢/hr. WF. *k* Incl. 7½¢/hr. WF. *l* Incl. 4% VF. *m* Incl. 5¢/hr WF. *n* Incl. 25¢ H, W, Ins., Vac. & Retirement. *o* Incl. 10¢ PF, 7¢ WF. *p* Incl. 3% WF, 8% PF. *r* Incl. 4% WF and 20¢ PF. *s* Incl. 5% W&PF, 4% VF, 1% NC, 6 PH. *t* Incl. 7½¢ H&WF. *u* Incl. 1½% PF. *v* Incl. 10¢ WF. *w* Negotiating. *x* Incl. 8¢ WF. *y* Incl. 22½¢ WF. *z* Incl. 7½¢ IF, 5¢ H&WF. A Incl. 15¢ WF, 15¢ PF & 20¢ B.F. B Incl. 3% WF. C Incl. 2½¢ H&WF. E Plus 6% WF, plus travel pay per day. F Plus $4/per day Annuity contrib. H Incl. 7¢ WF, 6% VF. I Incl. 15¢ H&WF. J Incl. 5% WF. 6PH. K Incl. 10¢ WF, 12½¢ VF, 7½¢ PF. L Incl. 3% WF, 3% PF, 2% VF, 1% EF. M Incl. 7½¢ PF. N Incl. 1% WF. O Incl. 2% WF, 1% PF. R Incl. 12¢ WF and 1¢ apprentice. S Incl. 12½¢ H and WF. T Incl. 21¢ H, W & VF. U Incl. 7½¢ WF, 4% VF, 1% PF. V Incl. 8½¢ WF. W Incl. 2% VF. X Incl. 6¢ VF. Y Incl. 7¢ H & WF.

MEXICO CITY PRICES

In Pesos, F.o.b. City		Aug '54	Sept '54
Common Wages—Building (8 hr. day) (Peons)	av. per hr.	1.19	1.19
Common Wages—Heavy Const. (8 hr. day) (Peons)	av. per hr.	1.19	1.19
Skilled Labor Wages			
Carpenters (8 hr. day) 1 cl.	av. per hr.	2.25	2.25
Bricklayers (8 hr. day) 1 cl.	av. per hr.	2.25	2.25
Struct. Iron Workers (8 hr. day)..... Remachadores.	av. per hr.	1.37*	1.37*
Struct. Steel Shapes			
3"-15" x 12 meters	per metric ton	1428.62	1428.62
Reinf. Steel, Corr. Rods			
⅜" x 11 meters	per ton	1490.00	1490.00
½" x 11 meters	per ton	1490.00	1490.00
⅝" x 11 meters	per ton	1490.00	1490.00
¾" x 11 meters	per ton	1490.00	1490.00
⅞" x 11 meters	per ton	1490.00	1490.00
1" x 11 meters	per ton	1490.00	1490.00
Gravel truck load of 3½ cu. meters			
Blue Gravel	per tr. load	69.00	69.00
Rose Gravel	per tr. load	62.00	62.00
Cement, Std. Port. (Tolteca)	per ton	180.00	180.00
Lumber			
3rd Class Pine	per M ft.	850.00	850.00
1st Class Pine	per M ft.	1500.00	1500.00
2nd Class Pine	per M ft.	1300.00	1300.00

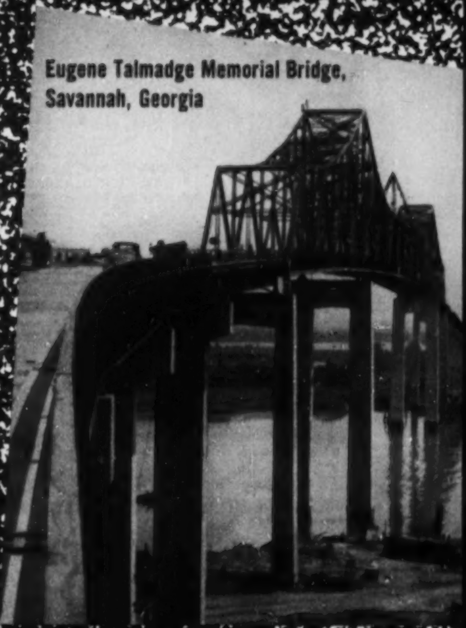
* 1st & 2nd floors. Aver $4.38

ENR Skilled Average: (Bricklayers, Carpenters, Iron workers): $3.180 **ENR Common Average:** $2.019

Folsom Dam across American River, Folsom, California

Versatility...

MERRITT-CHAPMAN & SCOTT
CORPORATION
Founded in 1860
General Offices: **260 MADISON AVENUE, NEW YORK 16, N.Y.**
CLEVELAND • CHICAGO • WASHINGTON, D.C. • HOUSTON • BIRMINGHAM



Eugene Talmadge Memorial Bridge, Savannah, Georgia

U. S. Army Signal Corps Depot, Tobyhanna, Pennsylvania

Current M-C & S Construction at Home and Abroad—

75,000-Ton per year Newsprint Mill, Kawerau, New Zealand

Your Confidence
Is Justified
Where
This Flag
Flies

BUILDING BOARD & LATH, INSULATION AND WATER TUBING—DELIVERED, TRUCKLOAD LOTS

	GYPSUM PLASTER BOARD tapered edge per Msq ft ½"	GYPSUM PLASTER BOARD tapered edge per Msq ft ⅝"	GYPSUM BOARD LATH plain or perf per Msq ft ⅜" x 16" x 48"	GYPSUM SHEATHING tongue & groove per Msq ft ½" x 2' x 8'	FIBER BOARD SHEATHING asph impreg & coat per Msq ft ½" sq ed	FIBER BOARD SHEATHING asph impreg & coat per Msq ft 25/32" T&G	FIBER BOARD INSULATION sq edge, paint per Msq ft ½"	MINERAL WOOL INSULATION batts, vap barr per Msq ft 3"	COPPER WATER TUBING—TYPE L 2000 ft lots per ft[a] ⅜"[q]	COPPER WATER TUBING—TYPE L 2000 ft lots per ft[a] ½"[r]
Atlanta	......	......	......	......	......	......	......	......	......	......
Baltimore	$48.75	$43.00	$31.00[a]	$52.30[a]	$67.60[a]	$110.00[a]	$66.00[a]	$70.00[a]	$.1449	$.2029
Birmingham	67.00	56.00	0.42[b]	67.50	62.00	92.00	79.00	62.00	.1647	.2307
Boston	55.00	48.00	35.00	55.00	67.50	113.75	72.00	0.08[k]	.1449	.2029
Chicago	67.00	50.00	34.00	50.00	77.00	113.00	73.00	84.00	......	......
Cincinnati	65.00	55.00	33.40[c]	65.00	70.00	115.00	70.00	75.00[l]	.1647	.2307
Cleveland	45.50	36.50	36.50	75.00	75.00	110.75	75.00	75.00	14.49[f]	20.29[f]
Dallas	55.00	52.50	40.00	62.50	73.50	122.50	70.00	91.50	.1449	.2029
Denver	60.00	52.50	40.00	60.00	73.00	123.00	73.00	71.00[m]	.1449	.2029
Detroit	55.00	48.50	35.75	49.50	54.00[ce]	91.00[ce]	53.00[ce]	61.00[dn]	n.a.	23.82[f]
Kansas City	65.00	55.00	40.00	65.00	72.00	120.00	75.00	85.00	.3294[g]	.4614[g]
Los Angeles	50.00	45.00	0.31[b]	53.00	71.87	121.25	70.00	80.00	.2029	.2468
Minneapolis	64.00	75.00	0.40[b]	65.00	70.00	114.00	70.00	78.00	.1375[h]	.1925[h]
Montreal	58.00	......	39.00	64.00	......	......	......	......	......	......
New Orleans	......	......	......	......	......	......	......	......	......	......
New York	50.00	44.50	34.00	51.00	65.00	108.00	65.00	72.00p	14.49[f]	20.29[f]
Philadelphia	......	......	......	......	......	......	......	......	......	......
Pittsburgh	55.00	65.00	40.00	68.00	60.00	102.50	57.50	68.00	0.23	0.28
St. Louis	60.00	50.00	45.00	60.00	70.00	115.00	75.00	75.00	.2029[i]	.2468[j]
San Francisco	49.00[c]	41.50[c]	0.33[b]	53.00[o]	......	94.00	60.25	66.50	.1449	.2029
Seattle	57.00	50.50	40.00	59.00	71.40	120.35	70.20	86.00	.1449	.2029

[a] fob city [b] sq yd [c] carloads [d] 4", fob Alexandria, Ind [e] 56,000 sq ft up quantity [f] per 100 ft [g] deliv to job in area [h] 10,000 ft & over [i] 2,000–10,000 ft; 10,000 ft up: $0.1925/ft [j] 2,000–10,000 ft; 10,000 ft up: $0.2342/ft [k] sq ft 2-in: 6¢/sq ft [l] 4-in: $78.00/M sq ft [m] flameproof: $75.00/M sq ft [n] 11,000 sq ft up quantity [o] plain core; asph core: $56/M sq ft [p] 2-in: $52/M sq ft [q] ½" O.D. [r] ⅝" O.D.

PREFABRICATED, INSULATED METAL WALL PANELS—FOB PLANT

	3¼" thick 24" wide, 1½" glass fiber insulation, fluted surface			3" thick, 16" wide, glass fiber filled, flush surface		3¼" thick, 24" wide, 1½" gl fib ins, flush surface		1 9/16" thick, 1½" gl fib ins, 20 ga gal stl back, flush surf			3¼" thick, 1½" gl fib ins, 18 ga gal stl back, fluted surf		
Surface	Zn-coat stl, 20 ga	Alum 16 ga	Stainless stl, 20 ga	Carbon steel	Aluminum	Carbon steel	Aluminum	Gal steel	Enam steel	Aluminum	Gal steel	Enam steel	Aluminum
$ per sq ft	1.70[a]	2.10[a]	3.10[a]	1.20[b]	1.65[b]	1.20[c]	1.50[c]	1.15[d]	1.18[d]	1.61[d]	1.25[d]	1.20[d]	1.60[d]
"U" factor†	0.18	0.16	0.17	0.20	0.20	0.13	0.13	0.40	0.40	0.40	0.15	0.15	0.15

[a] Q-type panels fob plant Ambridge, Pa; based on quantities of 3000 sq ft or more; price depends on amount of fabrication involved [b] "C"-type fob plant Baltimore, Md [c] F-type fob plant Pittsburgh, Pa [d] fob plant Detroit, based on quantities of 10,000 sq ft or more † coefficient of heat transmission, air to air, outside wall

	PORCELAIN-ENAMEL STEEL FACE, COATED STEEL BACK*								ASBESTOS CEMENT FACE#				FIELD ASSEMBLED**		
	Insulrock core			Gl fib core bet 2 shts ⅛" asb cem bd	Gl fib core ¼" alum honeycomb		Foamglas core, ¼" alum hc		Insulation bd core bet 2 shts ⅛" asb cem bd				3¼" thick, 2' wide, 1½" gl fib ins, zn-coat stl back, fluted surface		
Core thick	⅞"	1⅜"	1⅞"	1"	1"	1½"	1½"	2"	7/16"	⅞"	1 5/16"	1¾"	......	......	......
Surface	Porcelain-enamel steel								Asbestos cement board				Zn-coat 20 ga stl	Alum 16 ga BS	Galbestos V-bm, mar
$ per sq ft	2.00	2.30	2.39	2.70	3.00	3.10	3.15	3.35	0.26	0.32	0.38	0.44	1.50	1.90	1.40
"U" factor†	0.35	0.25	0.19	0.20	0.20	0.15	0.21	0.16	0.47	0.29	0.21	0.17	0.18	0.16	0.16

** fob plant, Long Is. City, N.Y. *# fob plant, Billerica, Mass; based on 5-ton quantities *** G-Type, fob plant, Ambridge, Pa. *† coefficient of heat transmission, air to air, outside wall

EQUIPMENT OPERATOR WAGE RATES

Sept. 1954 ENR 20-Cities	Truck drivers 1½ T	Truck drivers −4 cy Dump	Truck drivers +4 cy	Tractor Operators incl bulldozers 34-49 hp	Tractor Operators incl bulldozers 70–100 hp	Tractor Operators incl bulldozers 100 & over	Tractor scraper 15–16 cy	Power cranes & shovels ½ cy	Power cranes & shovels ¾ cy	Motor grader oper	Air comp oper	Air tool oper
Atlanta	1.35	1.60	1.60	2.25	2.295	2.235	2.225	2.90	2.90	2.225	1.90	1.50
Baltimore	1.65[a]	1.80[a]	1.90[a]	2.25	2.25	2.25	2.25	3.10[b]	3.10[b]	2.25	3.10[b]	2.25
Birmingham	1.37	1.65	1.92	2.385	2.385	2.385	2.525	2.525	2.525	2.385	2.11	1.45
Boston	1.945[c]	.....	.....	2.825[d]	2.825[d]	2.825[d]	2.825[d]	3.20	3.20	3.20	2.555	2.18[e]
Chicago	1.90[f]	.....	.....	2.85[g]	3.00[h]	2.90[i]	2.70	3.30	3.30	2.80	2.80	.....
Cincinnati	2.00[j]	2.00[j]	2.00[j]	2.85	2.85	2.85	2.85	3.10	3.10	3.10	3.10	3.10
Cleveland	2.325	2.325	2.325	3.025	3.025	3.025	3.025	3.275	3.275	3.025	2.90[k]	2.90
Dallas	1.45	1.45	1.45	1.45/2.625[l]	1.50/2.625[l]	1.50/2.625[l]	1.50/2.625[l]	1.50/2.625[l]	1.60/2.625[l]	1.50/2.625[l]	1.45/2.00[l]	1.45/1.55[l]
Denver	2.00	2.00	2.10	2.00	2.61	2.61	2.61	2.78	2.78	2.61	2.61	2.225
Detroit	2.31[a]	2.31[a]	2.31[a]	3.20[m]	3.20[m]	3.20[m]	3.20[m]	3.20[m]	3.20[m]	3.20[m]	2.925[m]	.....
Kansas City	1.965[n]	2.065[o]	2.065[p]	2.175	2.725[q]	2.725[q]	2.725[r]	2.97	2.97	2.585[s]	2.725[t]	2.115
Los Angeles	2.225[u]	2.225[u]	2.285[u]	2.80[m]	2.80[m]	2.80[m]	3.21[m]	3.03[m]	3.03[m]	2.94[m]	2.50[m]	2.41[m]
Minneapolis	2.05	2.05[v]	2.20[w]	2.43	2.65[q]	2.87[x]	2.65	2.87[y]	3.13[z]	2.43	2.32	2.15
New Orleans	1.525	1.525	1.525	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.10	1.60
New York	1.92¼[aa]	2.52[bb]	2.52[bb]	3.176[cc]	3.176[cc]	3.176[cc]	3.31[cc]	4.095[cc]	4.095[cc]	3.31[cc]	3.31[cc]	2.78[cc]
Philadelphia	1.825/2.025[u]	1.825/2.025[u]	1.825/2.025[u]	2.97/3.72[m]	2.97/3.72[m]	2.97/3.72[m]	2.97/3.72[m]	2.97/3.72[m]	2.97/3.72[m]	2.97/3.72[m]	2.79[m]	1.95[m]
Pittsburgh	2.125	2.125	2.125	2.875	3.125	3.175	3.175	3.275	3.275	3.175	3.175	2.125
St. Louis	2.10	2.10	2.10	3.125[u]	3.125[u]	3.125[u]	3.125[u]	3.125[u]	3.125[u]	3.125[u]	2.525[u]	2.10
San Francisco	2.10	2.10	2.33[w]	2.845	2.845	2.845	2.845	3.175	3.175	3.005	2.455	2.175
Seattle	2.405[n]	2.405[dd]	2.605[ee]	2.53	2.73	2.73	2.73	3.08	3.08	2.83	2.53[e]	2.40
Montreal	1.25	1.25	1.25	1.63	1.63	1.63	1.63	1.89	1.89	1.63	1.50	1.50

[a] incl 5¢/hr HWF [b] straight time, broken $3.25 [c] 2-axle; 10-wheel $2.00; Euclid $2.20 [d] intermediate [e] bldg constr; highway $2.075 [f] less than 2-t [g] blade [h] scoop, bldg [i] scoop, road [j] plus $2 pd by employer for hosp, death benefits to family [k] bldg constr; steel constr $3.275 [l] higher rates are union, other taken from min wage scale approved by County Commissioners Court [m] incl 10¢ HWF [n] flatbed [o] excavating [p] flatbed hard matls 2½-t [q] over 50 hp [r] blade grader [s] form and subgrade [t] single [u] incl 7½¢ HWF [v] up to 6 cy [w] 6–8 cy [x] cat oper [y] up to 3½ cy [z] 3½ cy & over [aa] applies to local 807 [bb] incl 3% WF, 2% PF, 11 PH [cc] incl 5% WF [dd] up to 5 cy [ee] 5 cy & over

CAST IRON
ARMORED CONCRETE
CURBING FOR
LINCOLN TUNNEL
APPROACH . . .

. . . INSTALLED IN 1938

HAS NEVER FAILED IN SERVICE

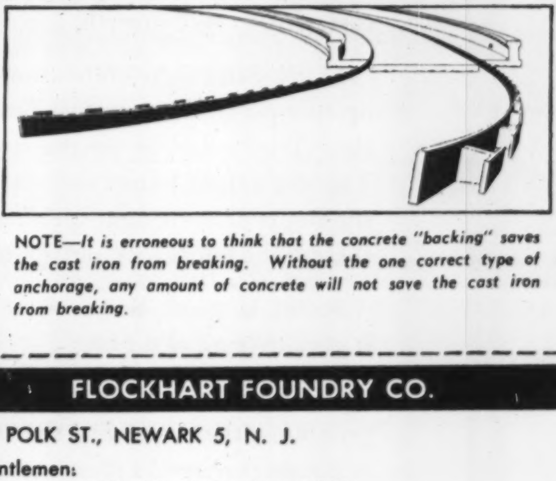
1925—The apparently irrational idea of combining two weak materials—cast iron and concrete—into an impregnable unity popped up.

1932—A trial radial section of armored concrete curb was installed at the New Jersey entrance to the Holland Tunnel to replace a worn stone curb set in 1927.

1938—9200 lineal feet of armored concrete was installed on the New York and New Jersey approaches to the Lincoln Tunnel, 75% being curbs entirely accurate to both horizontal and vertical curves.

1953—A recent inspection showed every single foot of the curb to be without blemish.

2032—From its performance to date it is reasonable to forecast a century of immunity to impact, abrasion and corrosion.



NOTE—*It is erroneous to think that the concrete "backing" saves the cast iron from breaking. Without the one correct type of anchorage, any amount of concrete will not save the cast iron from breaking.*

FLOCKHART FOUNDRY CO.
75th
Anniversary
1879 - 1954

WRITE FOR COMPLETE INFORMATION TODAY!

* ARMORED CONCRETE . . . a product of FLOCKHART FOUNDRY COMPANY carries a 15-year "cast iron" guarantee.

FLOCKHART FOUNDRY CO.

90 POLK ST., NEWARK 5, N. J.

Gentlemen:
Please send Flockhart Catalog #141

name..

co. name..

st. and no...

city, state...

How to protect the taxpayer against the "*WEAK LINK*"

Here's a timely message to the men responsible for the investment of tax dollars in sewage-works . . . the treatment plant as well as the sewer systems themselves.

Investing tax dollars in sewage works is a very real responsibility—shared by every city official, engineer and operator. These men know that two outstanding wasters of the taxpayer's dollar are exorbitant treatment costs due to infiltration and sewer-maintenance costs due to root growth.

Many cities fight infiltration and root growth successfully . . . up to a point. They install Transite® Sewer Pipe with the tight Ring-Tite® coupling for the street sewer lines. They know that, with Transite's tight joints, infiltration is sure to be kept far, far below the limits of even rigid specifications. And they know, too, that these tight joints lock out roots.

So far, so good. But such assurance does not go far enough—it goes *only up to a point!*

For there may be a "weak link" in this carefully planned program—the possibility that *the pipes which connect the homes to the street sewer* do not measure up to the standards of joint tightness set for the street sewers.

JOHNS-MANVILLE
JM
PRODUCTS

Johns-Manville

This network of sewer lines is also important in planning

This network of building-sewer lines is very extensive. It equals or exceeds the footage of the main system, with the result that, unless these pipes, too, have tight joints, this building-sewer network may function as a vast underground drainage system. In areas of high ground-water table and during seasonal rains, this excess infiltration is collected and dumped into the street sewers. This overloads the treatment plant . . . adds to the cost of treatment and *defeats the very purpose of careful street-sewer and treatment-plant design.*

And, to make matters worse, joints which permit infiltration also open the door to root growth—again adding to the expense and trouble.

An important corrective step is being taken by many communities

Today progressive municipalities can take steps to make *every link* in the over-all sewer system a strong one. They can see to it, for example, that their codes specify, as do hundreds of codes throughout the country—the use of Johns-Manville Transite Building-Sewer Pipe. This assures in the building-sewer lines the same joint tightness provided by Transite Sewer Pipe in the city-street sewers.

You can take the immediate step of learning more about this asbestos-cement pipe with the tight joints that remove the weak link and give you the efficient, money-saving sewer system you plan it to be. Just fill out the coupon.

Johns-Manville, Box 60, New York 16, N. Y.

Yes, let me have some of the facts about Transite Building-Sewer Pipe, the strong asbestos-cement pipe with the tight Ring-Tite Coupling.

Name____________________

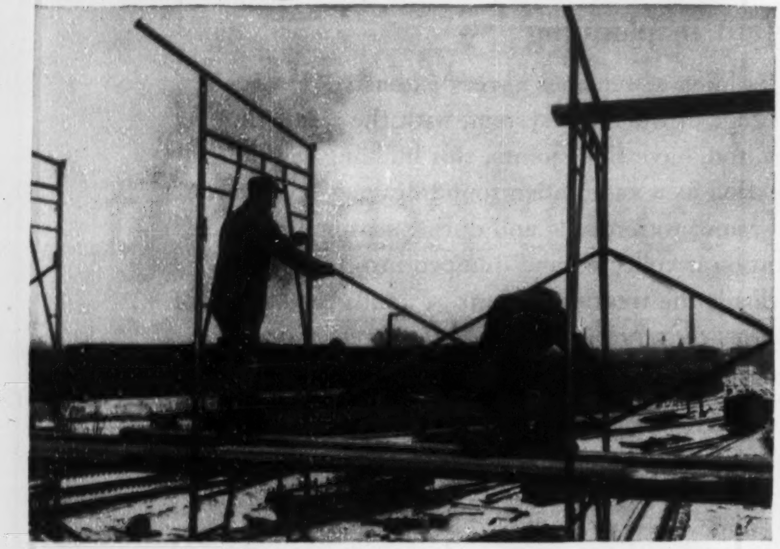
Address____________________

City________________State________

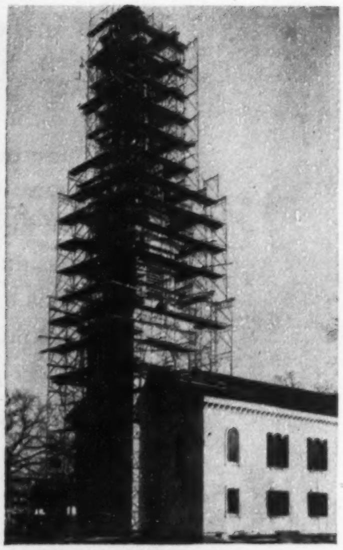
TRANSITE PIPE

(*Advertisement*)

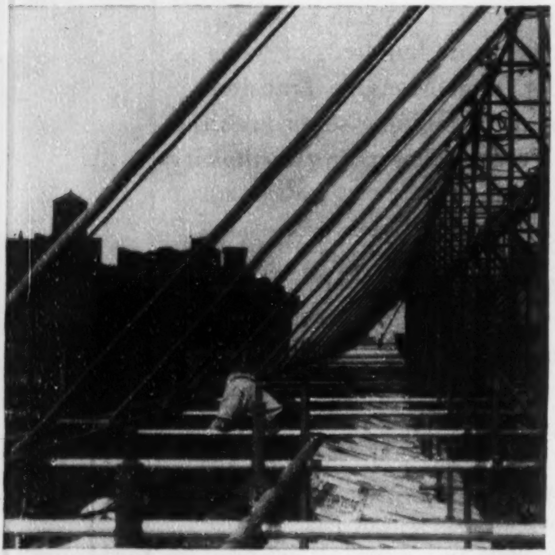
Scaffolding News in Pictures . . .



TRACKS BELOW—Crossbraces are secured to frames by fast, gravity-action "Slideloks" as erectors put up "Trouble Saver"® Sectional Steel Scaffolding for masonry work on the New York Central's new diesel repair shops in Buffalo, N. Y. Seigfried Construction Co. rented 300 6'6" "Trouble Saver" frames to speed this job. Overhead protection attachments are used so that scaffold could be covered and heated.

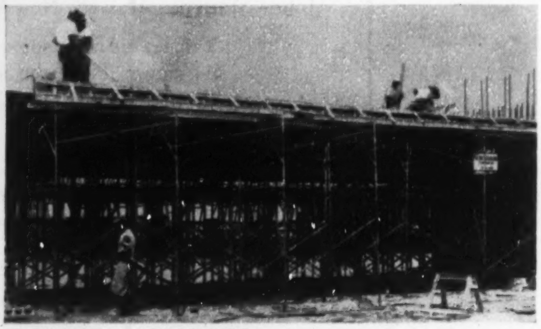


TAILORED TO FIT—This 160 ft. high, 260-frame "Trouble Saver" Scaffold puts men close to repair work on First Congregational Church, West Haven, Conn. Patterson Construction Co., New Haven, is the contractor.



BUILT FROM THE TOP DOWN—For cornice removal on an 18-story building at 30 Union Square West, New York, J. H. Taylor Construction Co. uses this outrigger "TubeLox"® Scaffold, cantilevered 6 ft. beyond the 6 ft. high parapet wall to solve the problem. Steel cables are anchored to the roof, then run up over the "TubeLox" complex "towers" at right which support a two-level hanging "TubeLox" Scaffold below the cornice.

BOTH WAYS AT ONCE—Every part of the job is easily reached by the 160 masons on the Pruitt Housing Project in St. Louis, Mo. 276 5-ft. wide "Gold Medal" Scaffolding Machines are used by I. E. Millstone, general contractor, to provide quick adjustment to proper working heights as the job progresses. Overhead protection attachments support planking.



GOLDEN SHORES—To provide safe, economical shoring for this concrete slab overpass, joining two parts of the Chatlos Motel in Golden Shores, Fla., the Taylor Construction Co. rented 413 5'-wide "Trouble Saver" Sectional Steel Scaffolding frames. Auto traffic will pass beneath the overpass, built on a curve. The center panel of the 8'-wide slab varies in thickness from 3' at the abutment to 16" at the center of the arch.

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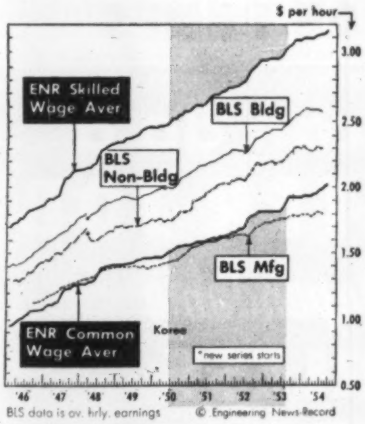
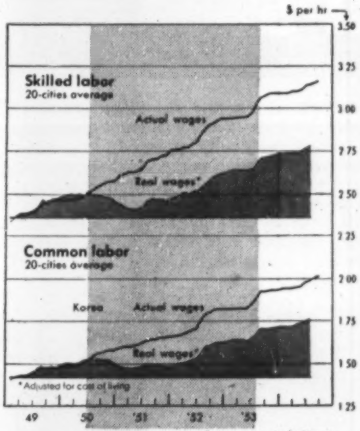


BLS data is av. hrly. earnings © Engineering News-Record



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Construction wages—ENR 20-cities averages

SKILLED LABOR, dollars per hour
(Bricklayer, carpenter, ironworker average)

	1926	1932	1939	1945	1946	1949	1950	1952	1953	1954
J	1.24	1.15	1.43	1.64	1.70	2.35	2.46	2.76	2.94	3.09
F	1.24	1.11	1.43	1.64	1.73	2.35	2.47	2.76	2.95	3.09
M	1.24	1.11	1.43	1.64	1.74	2.38	2.47	2.77	2.95	3.10
A	1.25	.95	1.44	1.65	1.76	2.38	2.48	2.78	2.95	3.10
M	1.26	.96	1.44	1.65	1.77	2.38	2.48	2.80	2.96	3.11
J	1.27	.99	1.44	1.66	1.80	2.39	2.52	2.81	2.98	3.13
J	1.27	1.00	1.44	1.66	1.82	2.41	2.52	2.85	3.02	3.14
A	1.28	.98	1.44	1.67	1.83	2.44	2.54	2.89	3.06	3.15
S	1.28	.99	1.44	1.67	1.84	2.45	2.55	2.91	3.07	3.17
O	1.29	.98	1.44	1.67	1.85	2.46	2.56	2.92	3.08	...
N	1.29	.97	1.46	1.68	1.86	2.46	2.57	2.94	3.08	...
D	1.29	.98	1.46	1.68	1.87	2.46	2.58	2.94	3.08	...
Av	**1.27**	**1.02**	**1.44**	**1.66**	**1.80**	**2.41**	**2.52**	**2.84**	**3.01**	...

COMMON LABOR, dollars per hour
(Building and heavy construction average)

	1926	1932	1939	1945	1946	1949	1950	1952	1953	1954
J	.54	.45	.68	.89	.95	1.42	1.49	1.66	1.82	1.94
F	.54	.45	.68	.89	.97	1.42	1.49	1.66	1.82	1.94
M	.54	.44	.68	.89	.99	1.42	1.49	1.67	1.82	1.94
A	.54	.41	.68	.90	1.00	1.43	1.49	1.68	1.83	1.95
M	.55	.41	.68	.91	1.02	1.43	1.51	1.69	1.83	1.96
J	.55	.41	.68	.92	1.03	1.44	1.53	1.71	1.86	1.98
J	.55	.41	.68	.92	1.06	1.47	1.54	1.76	1.88	2.00
A	.56	.42	.69	.92	1.07	1.47	1.56	1.80	1.93	2.01
S	.56	.43	.69	.92	1.07	1.48	1.56	1.81	1.93	2.02
O	.55	.43	.69	.92	1.07	1.48	1.57	1.82	1.93	...
N	.56	.43	.69	.92	1.08	1.48	1.58	1.82	1.93	...
D	.56	.43	.69	.94	1.09	1.48	1.58	1.82	1.93	..
Av	**.55**	**.43**	**.68**	**.91**	**1.03**	**1.45**	**1.53**	**1.74**	**1.88**	...

Averages include fringe benefits—see 1953 wage table by trades for each of 20 cities for nature and extent of these—welfare fund, pension fund and others.

Skilled and common wage rates in 20 cities

ENR 20-Cities, U. S.	Hrs per day	Bricklayers 1953 Low			Carpenters 1953 Low			Structural Ironworkers 1953 Low			Common labor (Av bldg & heavy constr) 1953 Low		
		Low	Aver	High	Low	Aver	High	Low	Aver	High	Low	Aver	High
Atlanta	8	$2.90	$2.983	$3.10	$2.35	$2.412	$2.50	$2.60	$2.662	$2.75	$1.13	$1.215	$1.28
Baltimore	8	3.20[a]	3.20	3.20[a]	2.58	2.651	2.75	3.125[e]	3.20	3.275[e]	1.565[e]	1.611	1.675[e]
Birmingham	8	3.00	3.05	3.15	2.24	2.293	2.40	2.50	2.687	2.825[d]	1.275	1.306	1.35
Boston	8	3.06[b]	3.112	3.18[c]	2.625	2.687	2.75	2.82	2.934	3.15[e]	1.99[b]	1.99	1.99[h]
Chicago	8	3.25[d]	3.337	3.40[d]	3.00[f]	3.087	3.15[c]	3.05	3.137	3.20[f]	2.20[f]	2.287	2.35[e]
Cincinnati	8	3.12	3.172	3.225	2.625	2.708	2.875	2.815	2.884	2.99[d]	1.92	1.97	2.02
Cleveland	8	3.12[e]	3.21	3.25[e]	3.075	3.148	3.20	3.075	3.148	3.20[d]	2.325	2.398	2.45
Dallas	8	3.437	3.484	3.50	2.48	2.54	2.625	2.625	2.708	2.75	1.337	1.365	1.40
Denver	8	3.45	3.479	3.50	2.625	2.687	2.775	2.50	2.604	2.75	1.725	1.756	1.80
Detroit	8	3.18[f]	3.257	3.33[g]	2.93[f]	3.005	3.08[g]	3.18[f]	3.205	3.23[g]	2.18[f]	2.23	2.28[g]
Kansas City	8	3.50	3.552	3.625	2.55	2.623	2.675	2.68	2.752	2.805	1.88	1.921	1.98
Los Angeles	8	3.175	3.197	3.285[h]	2.57	2.635	2.70	2.77	2.906	2.925[d]	1.94	1.995	2.05
Minneapolis	8	3.05	3.094	3.125	2.55	2.62	2.70	2.72	2.778	2.82	1.82	1.896	1.95
New Orleans	8	2.95	3.00	3.05	2.32	2.37	2.42	2.65	2.741	2.80[f]	1.225	1.325	1.375
New York	7	3.85[i]	3.858	3.87[j]	3.24[k]	3.335	3.43[e]	3.50[k]	3.591	3.759[k]	2.11[k]	2.184	2.288
Philadelphia	8	3.61[ks]	3.611	3.62[ls]	2.90	3.00	3.10	3.32[p]	3.393	3.51[pr]	1.90	1.952	2.025
Pittsburgh	8	3.40	3.437	3.475[d]	3.00	3.10	3.20[d]	2.875	3.05	3.225[d]	1.90	1.962	2.025[e]
St. Louis	8	3.55[m]	3.579	3.62[mn]	2.90	2.931	2.975[d]	2.90	2.983	3.10[d]	1.97	2.035	2.095[e]
San Francisco	8	3.25[e]	3.406	3.475[d]	2.705	2.786	2.905[e]	2.85	2.931	3.075[d]	1.85	1.931	2.075[e]
Seattle	8	3.30	3.30	3.30	2.58	2.58	2.58	2.78	2.78	2.78	2.16	2.169	2.195
Montreal, Can.	8	1.90	1.933	2.00	1.70	1.733	1.80	1.80	1.833	1.90	1.20	1.217	1.25

•[a] Incl 10¢ H&WF •[b] Incl 6¢ WF •[c] Incl 10¢ WF •[d] Incl 7½¢ WF •[e] Incl 7½¢ H&WF •[f] Incl 5¢ WF •[g] Incl 8¢ WF •[h] Incl 11¢ H&WF •[i] Incl 3% WF, 3% PF •[j] Incl 3½% WF, 20¢ PF •[k] Incl 3% WF •[l] Incl 12¢ WF, 15¢ PF •[m] 3% VF •[n] Incl 7¢ WF •[o] Incl 4% WF •[p] Incl 9¢ WF •[r] Incl 7½¢ PF •[s] 7-hr day

Construction wages and benefits

The wages reported by ENR cover take-home pay plus fringe benefits. This applies to those shown here for 20 cities and reported monthly, also to the annual round-up of 27 trades in 57 or more cities which follows. An additional report covering construction equipment operators will be found with the October materials prices in the preceding pages. These equipment operator's rates will be published monthly henceforth, beginning with this issue.

With the consumer price or cost of living index running below its October, 1953 peak, real construction wages gained more percentagewise in 1954 than the mark-up in take-home pay plus benefits.

Consumer price index

US Bu of Labor Statistics—1947-49 = 100

	1939#	1945#	1949#	1950#	1951#	1952#	1953*	1954*
Jan	59.6	76.1	102.7	100.6	108.6	113.1	113.9	115.2
Feb	59.4	76.0	101.6	100.4	109.9	112.4	113.4	115.0
Mar	59.3	76.0	101.9	100.7	110.3	112.4	113.6	114.8
Apr	59.2	76.1	102.1	100.8	110.4	112.9	113.7	114.6
May	59.1	76.7	101.8	101.3	110.9	113.0	114.0	115.0
Jun	59.0	77.3	102.0	101.8	110.8	113.4	114.5	115.1
Jul	59.2	77.5	101.4	102.9	110.9	114.1	114.7	115.2
Aug	59.0	77.5	101.6	103.7	110.9	114.3	115.0	115.0
Sept	60.2	77.2	102.1	104.4	111.6	114.1	115.2	.....
Oct	60.0	77.2	101.5	105.0	112.1	114.2	115.4	.....
Nov	59.9	77.5	101.6	105.5	112.8	114.3	115.0	.....
Dec	59.6	77.8	101.0	106.9	113.1	114.1	114.9	.....

Pre-depr. high; 77.0, Nov 1925—Depr. low; 53.6, Apr 1933.
*** For details of latest revision see the February '53 Monthly Labor Review.**
# Interim adjusted series converted from 1935-39 = 100 1947-49 = 100 base.

Wage Rates—New York City

Dollars per hour

Year	Car-penters	Brick-layers	Masons' Laborers	Common Laborers	Structural Ironwkrs
1874	$0.23 (10 hrs.)	$0.43 (8 hrs.)	$0.18 (8 hrs.)	$0.14 (10 hrs.)	....
1890	.43 (8 hrs.)	.47 (8 hrs.)	.28 (8 hrs.)	.14 (9 hrs.)	....
1907	.63	.70	.38	.22 (8 hrs.)	$0.60 (8 hrs.)
1913	.63	.70	.38	.23	.63
1930	1.65	1.93	1.03	1.03	1.93
1932	1.33 (7 hrs.)	1.47 (7 hrs.)	1.00 (7 hrs.)	.65	1.68
1938	1.75	1.89	1.00	.91	1.93
1939	1.75	1.89	1.03	.91	1.93
1942	1.85	2.00	1.03	.95	2.00
1946	2.10	2.25	1.23	1.20	2.25
1947	2.47	2.65	1.44	1.44	2.56
1948	2.73	2.94	1.62	1.63	2.98
1949	2.75	3.20	1.70	1.70	3.00
1950	2.88*	3.30*	1.802*	1.802*	3.14*
1951	3.09*	3.548*	1.957*	1.957*	3.348*
1952	3.152*	3.674*	2.021*	2.021*	3.411*
1953	3.335*	3.858*	2.184*	2.184*	3.591*

*** incl benefits after Sept. 1950**

• **NYC** workers get these benefits under new 1954 wage contracts. For benefits under previous contract see page 127, Oct. 8, 1953.

Benefits

• **WELFARE:** 5%—carpenters, common labor, roofers**, waterproofers, hoisting engineers, shovel operators; 4%—bricklayers, reinforcing ironworkers*, cement finishers*, lathers*, painters**; 3%—structural ironworkers**, mosaic & terrazzo**, Glazers†, steamfitters**, sheet metal workers**; 15¢ hr—plasterers; 6% welfare and pension— tile layers; 5% welfare and pension, 1% national contribution—electricians; 12% fringe benefits —plumbers. †Also 5% pension; *4% pension; **3% pension.
• **PENSION:** 20¢ hr—plasterers; 5%, 4%, 3%—see welfare; 15¢ hr—plasterers
• **BENEFIT FUND:** 20¢ hr—plasterers; 3%—waterproofers
• **VACATION FUND:** 4%—electricians; 2%—steamfitters, sheet metal workers
• **PAID HOLIDAYS:** 6 ea—carpenters, common labor, electricians, hoisting engineers, tractor operators, power shovel operators
• **COST OF LIVING ESCALATORS:** most trades
• **CONTRACT STATUS:** carpenters, structural and reinforcing ironworkers, common labor, cement finishers, lathers, glazers, plumbers, roofers, waterproofers, sheet metal workers, hoisting engineers, expire 6/30/55; bricklayers, 5/31/56; mosaic & terrazzo, steamfitters, 6/30/56; tile layers, 8/3/55.

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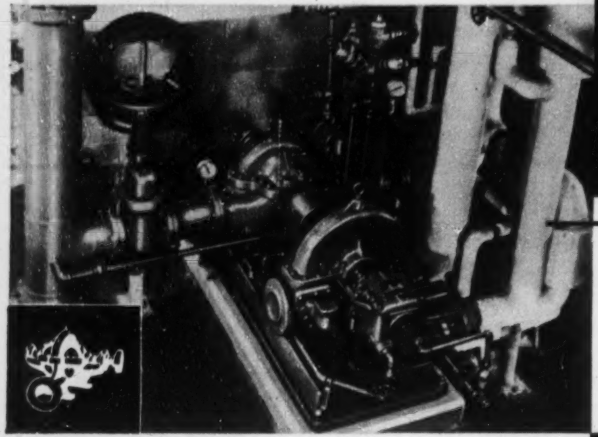

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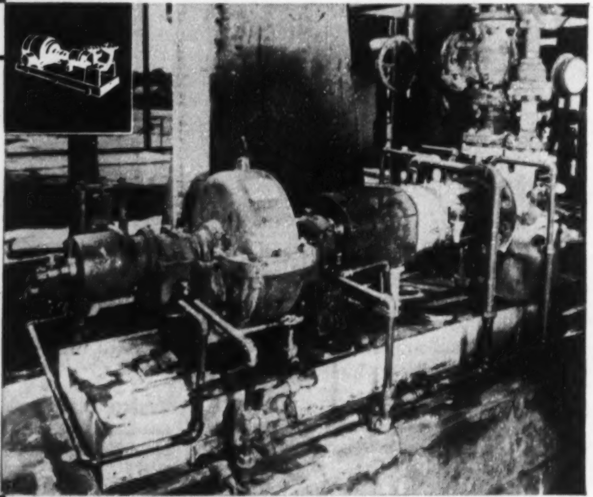
HEAVY DUTY CENTER-LINE MOUNT PUMPS—*The continuous transfer of crude charge stocks at high temperatures is handled by type PR pumps.* The Peerless line of packing gland construction and mechanical shaft seal construction pumps for handling hydrocarbons, chemical solutions and water at elevated temperatures and pressures is most complete. The pump in the view at the right is handling oil at 850° F. in an Oklahoma refinery. These refinery and chemical process pumps have a number of modern design features to recommend their installation. Fully described in Bulletin B-1605.



HORIZONTAL BOOSTER PUMPS—*Peerless multi-stage pumps for pumping hot or cold liquid in moderate capacities against medium and high heads.* Available in 2, 3, 4 and 5-stage designs for high head pumping. These Type TU pumps handle water and process liquids. Capacity range: to 3500 gpm; head range: to 1600 feet; hp range: to 350 hp. Pumps are of horizontal split-case design for easy maintenance. Quality construction throughout. The pump shown is operating on a cooling tower system. Request Peerless Bulletin B-1400 for complete Type TU pump details and description.

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Building trades wage rates—August 1, 1954

Quoted in $/hr., 8-hr. day; time and one-half for overtime after 40 hr. except where noted

Compiled by ENR City and State	Carpenters	Bricklayers	Struct Irwkrs	Reinf Irwkrs	Labor Bldg	Labor, Hvy Const	Stonemasons	Mason's Helpers	Plasterers	Mosaic & Terrazzo	Tile Layers	Cement Finishers	Lathers	Electrns (Inside)	Painters	Glaziers	Plumbers	Steamfitters	Roofers	Waterproofers	Sht Met Workers	Welders	Hoist Eng 1-Drum	Hoist Eng †2Drum	Tract Op (30 hp+)	Shovel Operator	Truck Dr (½T+)
Atlanta, Ga ... e	2.50	3.10	2.85	2.50	1.33	1.33	3.10	1.40	2.90	3.10	3.10	2.45	2.75	2.75	2.50	2.35	2.90	2.90	1.75	1.75	2.50	*	2.15	2.60	2.23	2.75	1.25
Austin, Tex ... f	2.45	3.30	[1]2.88	[1]2.60	§1.10	[A]1.00	3.00	1.35	3.18	3.00	3.00	2.50	3.18	§2.88	[2]2.25	2.25	2.88	2.87	[B]1.65	....	2.75	*	2.45	2.75	2.75	2.75	1.25
Baltimore, Md ... g	2.75	[a]3.20	[b]3.28	[b]3.08	[b§]1.68	[b§]1.68	[c]3.25	[§b]1.83	[b]3.08	[b]2.95	[b]2.95	[b]2.83	[b]3.08	2.98	[3b]2.43	2.38	[§b]2.98	[§b]2.98	[c]2.20	2.20	[§b]2.98	*	[C]2.45	[D]3.10	[C]2.45	[D]3.10	[§bb]1.83
Billings, Mont ...	[1]2.51	[1]3.03	[1]2.78	[1]2.78	[1]1.92	[1]1.90	[1]3.03	....	[1]2.91	[1]3.03	[1]2.38	[1]2.38	[1]2.53	[1]2.73	[1E]2.43	[1]2.38	[1]2.78	[1]2.78	[1]2.33	[1]2.33	[1c]2.58	[1]2.78	[1]2.29	[1]2.51	[1]2.51	[1F]2.51	[1]1.97
Birmingham, Ala ... h	2.40	3.15	[b]2.83	2.50	1.30	1.40	3.15	....	2.62	2.80	2.80	2.48	2.25	3.00	2.48	2.25	[b]2.95	[b]2.95	2.25	2.20	[b]2.75	*	2.25	2.53	2.39	2.53	1.37
Bismark, N D ...	2.20	3.00	2.70	2.60	1.50	1.50	3.00	1.70	2.75	....	3.00	2.25	1.75	2.35	2.05	2.05	2.37	2.37	2.00	2.00	2.25	*	2.00	2.15	2.00	2.25	1.50
Boise, Idaho ... d	2.50	3.10	§2.95	§2.70	1.95	1.95	3.10	....	2.35	....	3.10	[G]2.60	2.76	2.70	[H]2.50	....	2.75	2.75	2.30	....	[IJ]2.42	2.72	2.25	2.35	J2.25	[K]2.60	[L]2.05
Boston, Mass ... i	2.75	[e]3.19	[b]3.28	[§b]3.15	[d]2.14	[d]2.14	[e]3.19	[d]2.31	[f]3.30	[g]3.06	[e]3.09	[e]3.23	[f]3.30	[h]3.12	[b]2.58	[e]2.56	§[e]3.10	[e]3.10	[e]2.83	[e]2.78	[i]2.96	[i]2.96	[i]3.20	[i]3.20	[i]2.83	[i]3.20	[k]2.20
Buffalo, N Y ...	2.91	[l]3.22	[b]3.03	....	2.18	2.18	....	....	3.12	....	....	2.85	3.09	[m]3.08	2.67	2.58	[e]3.20	3.00	2.76	....	2.92	....	[n]3.03	....	....	....	[n]2.11
Charleston, S C ...	2.25	2.50	2.75	2.50	1.00	1.00	2.50	1.00	2.50	2.50	2.50	1.75	2.00	2.75	1.75	1.75	2.75	2.75	1.75	....	2.50	....	1.85	2.15	1.60	2.40	1.00
Charleston, W Va ...	2.93	3.30	[b]3.08	[b]3.08	[a]1.85	[a]1.85	3.30	....	3.00	3.05	3.05	2.75	2.75	3.00	[7]3.00	2.40	3.00	3.00	2.33	....	2.73	....	2.85	2.85	2.85	2.85	[a]1.95
Chicago, Ill ... j	[c]3.30	[b]3.55	[c]3.35	[c]3.35	[b]2.50	[b]2.50	[b]3.55	[b]2.50	[10]3.63	3.30	[b]3.33	[c]3.30	[e]3.53	[p]3.53	[b]3.20	[c]3.47	[r]3.37	[dc]3.39	[c]3.45	[c]3.45	[bc]3.28	[c]3.35	[c]3.15	[c]3.15	[c]2.90	[c]3.50	1.90
Cincinnati, Ohio ... k	[1]3.08	3.33	[b]3.12	[b]2.95	2.12	2.02	3.33	2.52	3.10	3.10	3.10	2.75	3.05	[c]3.28	[8]2.55	2.90	[t]3.21	[u]3.34	[9]2.70	[b]3.08	3.00	*	3.10	3.10	3.10	3.10	[v]2.00
Cleveland, Ohio ... l	[10]3.28	[10b]3.33	[10b]3.28	[10b]3.28	[10]2.53	[10]2.53	[10b]3.18	[10]2.58	[10]3.28	[10]3.10	[10]3.10	[10]3.10	[10]3.28	[10]3.28	[10w z]3.10	[10]3.00	[10e]3.28	[10w]3.28	[10]3.28	[10]3.28	[10]3.20	[10]3.05	[10]3.18	[10]3.18	[10]2.68	[10]3.30	[10e]2.37
Columbus, Ohio ... m	2.78	3.40	[b]3.10	[b]3.10	1.95	1.95	3.30	2.15	2.98	2.68	2.68	2.68	2.98	3.03	[11]2.60	2.35	3.00	3.05	2.65	2.83	[b]3.03	[b]2.93	2.85	2.85	3.10	3.10	1.95
Concord, N H ... n	2.38	3.13	[b]3.10	[b]3.10	1.83	1.35	3.13	....	3.13	....	....	3.13	....	2.40	1.70	....	2.50	2.50	2.10	....	2.00	....	2.85	2.85	2.40	2.85	....
Dallas, Tex ... o	2.75	3.50	2.88	2.60	1.45	1.45	3.50	1.60	3.44	2.75	2.75	2.75	3.44	3.00	2.63	2.35	3.00	3.00	2.15	2.15	2.82	2.82	§2.50	§2.75	2.63	2.63	[M]1.45
Dayton, Ohio ... p	2.90	3.42	[b]3.08	[b]2.91	2.08	2.08	3.42	2.35	3.07	3.15	3.15	2.72	3.10	[m]3.32	2.77	2.65	3.16	3.16	2.68	2.68	2.90	[b]3.08	2.18	2.90	2.55	3.18	2.19
Denver, Colo ... q	2.85	3.50	2.85	....	1.88	1.88	3.50	2.28	3.30	§3.13	2.65	2.85	3.30	3.00	2.60	2.50	3.05	3.05	2.85	2.85	2.95	*	2.61	2.78	2.61	2.78	[12]2.00
Des Moines, Iowa ... r	2.80	3.55	2.88	2.88	2.05	2.05	2.80	2.05	2.80	2.80	2.80	2.80	2.80	3.08	2.55	2.35	[s]3.43	3.17	2.30	....	2.83	*	2.70	2.90	2.90	2.90	N2.15
Detroit, Mich ... s	[ee]3.21	[eq]3.45	[aa]3.33	[e]3.06	[e]2.45	[e]2.45	[eq]3.45	[e]2.45	[ebb]3.49	[ee]3.18	[aa]3.18	[e]3.00	[e]3.36	[dcc]3.52	[c]2.95	[dd]2.70	[bddee]3.20	[b]3.13	[13e]3.60	[e]3.00	[edd]3.23	*	[e]3.20	[e]3.20	[e]3.20	[e]3.20	[e]2.28
Duluth, Minn ... t	[b]2.58	3.10	2.97	2.72	[b]1.93	[b]1.93	3.10	....	3.00	....	[ee]2.50	[b]2.41	2.68	[bff]2.96	[b]2.38	[b]2.25	2.78	2.78	[b]2.63	....	[b]2.70	*	2.75	2.75	....	2.75	2.02
Fort Worth, Tex ... u	2.63	3.44	2.88	2.60	1.25	1.25	3.44	[O]1.30	3.38	2.75	2.75	2.50	3.38	[1]3.00	[14]2.50	2.35	2.90	2.90	2.20	3.44	[b]2.83	2.88	2.60	2.88	2.88	2.88	[P]1.00
Harrisburg, Pa ... v	2.58	3.12	3.24	2.99	1.75	1.75	3.13	1.90	2.88	3.00	3.00	2.80	2.75	2.93	2.13	2.30	2.83	2.83	2.32	2.05	2.65	*	3.25	3.25	2.88	3.50	1.88
Houston, Tex ... w	2.85	3.43	3.00	2.75	1.60	1.60	3.43	1.80	[ee]3.28	2.90	2.90	2.75	[ee]3.28	3.13	2.63	2.53	3.00	....	2.50	....	3.00	....	2.55	3.00	3.00	3.00	1.83
Indianapolis, Ind ...	3.03	3.25	[bhh]3.20	3.05	2.05	1.20	3.25	....	3.10	3.00	3.00	2.70	2.96	3.10	2.70	2.70	3.10	3.10	[Q]2.61	2.97	2.36	....	3.03	....	....	3.03	[v]2.10
Jackson, Miss ... x	2.25	3.00	2.55	2.30	1.05	1.05	....	....	2.50	2.75	2.75	2.50	2.25	2.65	2.13	....	2.65	....	[15]1.75	1.65	2.45	....	2.25	2.25	2.25	2.50	1.35
Jacksonville, Fla ... y	2.50	3.00	2.76	[a]2.51	1.00	1.00	3.00	1.10	2.75	2.63	2.63	[10]2.13	2.75	§3.00	[6, 16]2.25	2.30	3.00	3.00	2.30	2.30	2.50	*	2.45	2.45	2.04	2.45	1.50
Kansas City, Mo ... z	2.75	3.63	2.90	2.75	2.03	2.03	3.25	2.09	3.25	3.18	3.18	2.74	3.00	[mii]2.99	2.66	2.80	[§b]3.08	[§b]3.08	2.58	2.58	[b]3.14	*	2.73	2.97	2.18	2.97	[17]1.90
Los Angeles, Calif. ... aa	[1c]2.83	3.40	[ii]3.18	[ii]2.89	[ii]2.15	[ii]2.15	3.40	2.40	[§ee]3.56	2.61	3.00	[e]2.80	[kk]3.44	3.20	[‡ll]2.81	[ddii]2.66	[e]3.35	[e]3.35	2.75	2.75	3.00	*	[e]2.72	[e]2.72	[e]2.80	[e]3.03	[ii]2.28
Louisville, Ky ... c	2.77	3.27	[mm]3.05	[mm]3.05	1.80	1.80	3.27	2.13	3.13	1.90	2.82	2.70	2.88	3.05	2.65	2.50	3.08	3.08	2.20	2.20	2.75	2.92	2.90	2.90	2.90	2.90	[mm]2.11
Meridian, Miss ... bb	2.25	2.75	[18]....	[18]....	0.80	[R]0.75	2.75	[S]0.90	2.35	2.75	2.75	2.25	2.25	2.50	2.00	2.50	2.50	2.50	[T]1.65	2.35	2.45	2.45	[18]....	[18]....	[U]1.50	[V]1.75	[W]1.60
Milwaukee, Wis ... b	[c]2.99	[c]3.25	[d]2.97	[d]2.86	[c]2.18	[c]2.18	[c]3.25	[c]2.29	[d]3.02	2.90	[c]2.94	[c]2.73	[d]3.07	[nn]3.06	[e]2.61	2.67	[d]3.07	[d]3.07	[oo]2.70	[d]2.69	[d]2.87	[d]2.97	[c]2.73	[c]2.73	[c]2.89	[c]3.06	[c]2.23
Minneapolis, Minn ... cc	2.80	3.23	2.92	2.82	2.05	2.05	3.23	2.05	3.00	2.73	[oo]2.70	3.00	3.00	[pp]3.16	2.65	2.46	3.00	3.00	2.65	2.65	[e]2.98	*	2.75	2.75	[X]2.43	[Y]2.87	[Z]2.05
Nashville, Tenn ... d	2.38	3.03	2.65	2.50	1.15	1.55	3.03	1.30	2.75	2.75	2.75	2.25	2.63	2.85	2.25	2.08	2.85	2.85	2.10	2.10	2.48	....	2.05	2.30	2.05	2.50	[19]1.40
New Orleans, La ... dd	[10]2.47	3.10	[10c]2.85	[10c]2.55	1.43	1.43	3.10	1.38	[10]2.68	....	....	2.47	[c]2.70	[c]2.98	2.28	[b]2.48	[e]3.00	[e]3.00	[b]2.48	[b]2.48	[b]2.78	[b]2.78	[10]2.65	[10]2.65	2.65	2.65	1.53
New York City ... ee	[‡qq]3.57	[‡rr]4.16	[‡ss]3.97	[tt]3.67	[qqee]2.42	[qqee]2.42	....	....	[§uu]4.15	[ee]3.50	[vv]3.50	[‡tt]3.67	[‡tt]3.67	[§ww]3.63	[‡xx]3.09	[‡yy]3.67	[‡zz]3.92	[‡aaa]3.82	[bbb]3.67	[‡bbb]3.67	[‡ee]3.78	....	[qqee]3.83	[qqee]3.83	[qqee]3.18	[qqee]4.10	....
Newark, N J ...	[‡ccc]3.61	[‡ccc]3.76	[ee]3.98	....	‡2.70	‡2.70	....	....	[‡ccc]3.76	....	....	[‡ccc]3.76	‡3.50	[cccm]3.64	[‡eddd]3.56	....	[ee]3.71	[ee]3.71	[‡eee]3.58	....	[‡ee]3.60	....	....	....	....	....	....
Oklahoma City ... ff	2.63	3.50	2.75	2.75	1.70	1.00	3.50	1.85	3.30	2.75	2.75	2.75	3.30	3.00	2.45	2.35	2.90	2.90	2.36	....	2.80	....	2.40	2.40	2.13	2.40	§1.75
Omaha, Nebr ... gg	2.63	3.18	2.80	2.80	1.85	1.85	3.18	1.85	1.98	2.80	2.80	2.65	2.90	2.90	2.58	2.35	2.90	2.90	2.18	2.43	2.67	1.80	2.50	2.85	2.85	2.85	2.25
Philadelphia ... hh	3.20	[‡fff]3.92	[hhggg]3.63	[hhggg]3.38	1.95	2.25	3.25	1.95	[eee]3.63	3.33	[eee]3.28	3.20	[e]3.48	[ehhh§]3.65	[c]2.70	2.85	[iii]3.62	[iii]3.62	[e]3.05	[e]3.05	[e]3.39	*	[e]3.45	[e]3.45	[e]3.08	[e]3.70	[AAb]1.83
Phoenix, Ariz ... ii	[n]2.62	[n]3.50	[n]2.90	[n]2.62	[n]1.98	[n]1.98	[n]3.50	[n]2.37	[n]3.30	[n]3.50	[n]3.30	[n]2.62	[n]3.30	[n]2.90	[n]2.50	[n]2.40	[cn]3.05	[n]3.05	[n]2.47	[n]3.50	[nn]3.01	[n]2.55	[n]2.50	[n]2.75	[n]2.55	[n]2.75	[Z]2.05
Pittsburgh, Pa ... jj	[b]3.20	[b]3.63	[b]3.23	[b]3.23	[b]2.10	[b]2.10	[b]3.24	[b]2.43	[b]3.38	[b]3.24	[b]3.18	[b]3.20	[b]3.38	3.50	[e]2.95	[b]2.98	[b]3.38	[b]3.38	[b]2.95	[b]2.95	[b]3.28	[b]3.28	[b]3.25	[b]3.35	....	....	[b]2.20
Portland, Ore ... kk	2.65	[e]3.40	2.85	2.65	2.17	2.17	[e]3.40	....	3.15	2.90	3.05	2.70	3.05	[e]2.95	2.42	2.59	3.05	2.85	[b]2.73	....	[b]2.83	....	[b]2.53	[b]2.83	....	....	2.18
Providence, R I ... a	2.53	3.15	2.98	2.98	1.88	1.88	3.15	1.88	3.05	2.73	2.73	2.83	‡3.15	2.65	2.21	2.53	2.80	2.80	2.45	2.45	2.65	....	3.20	3.20	3.20	3.20	1.87
St Louis, Mo ... a	[b]3.13	[biii]3.63	[b]3.10	[b]3.10	[b]2.18	[b]2.18	[biii]3.63	[biii]2.65	[b]3.25	3.25	[b]3.08	[e]3.25	[b]3.25	[maabb]3.49	[20b]2.93	[b]3.18	[b]3.27	[p]3.39	[21b]2.98	[b]2.98	[b]3.33	[b]2.38	[b]2.58	[b]3.13	[b]3.13	[b]3.13	2.10
St Paul, Minn ... cc	2.80	3.23	2.92	2.82	2.05	2.05	3.23	2.05	3.00	§2.68	[ee]2.70	2.80	3.00	[pp]3.16	2.65	§2.36	3.00	3.00	2.65	2.65	[e]2.98	*	2.75	2.75	[X]2.43	[Y]2.87	[Z]2.05
Salt Lake City ...	2.50	3.00	....	....	1.78	1.78	3.00	2.13	2.75	....	2.00	2.55	2.75	2.80	[2]2.35	2.17	[e]2.80	[e]2.80	2.25	....	2.51	[e]2.80	2.33	2.55	2.50	2.65	[22]1.85
San Antonio, Tex ... ll	2.50	3.25	2.75	2.75	1.25	1.25	3.25	1.42	3.18	2.25	2.25	2.50	3.18	2.88	2.25	2.25	2.88	2.88	[23]1.80	....	2.75	2.15	2.15	2.50	2.15	2.50	1.93
San Diego, Calif ... aa	[1c]2.83	3.38	2.70	2.74	[ii]2.15	[ii]2.15	3.38	2.25	3.44	2.67	2.67	[e]2.80	3.25	3.20	2.53	2.26	2.90	2.90	2.35	2.35	2.63	*	2.57	2.57	2.65	2.88	2.13
San Francisco ... mm	[b]2.98	‡[e]3.65	[b]3.18	[§b]2.83	[b]2.15	[b]2.15	[‡b]3.65	....	[b]3.50	[‡§e]2.86	[b]3.18	[b]2.82	[§kkk]3.35	[b bb]3.27	[‡§u]2.79	[blll]2.71	[mmm]3.35	[mmm]3.35	[nnn]2.88	[nnn]2.88	[bb]3.08	*	[e]2.84	[e]2.84	[e]2.95	[e]3.28	[b]2.18
Seattle, Wash ... nn	[e]2.75	[e]3.40	[e]2.95	[e]2.75	[e]2.35	[e]2.35	[e]3.40	[e]2.65	3.25	[e]2.98	[e]3.15	2.72	3.05	[z]3.06	[b]2.71	2.38	[ooo]3.26	[ooo]3.26	2.75	2.75	[ppp]3.00	3.05	[e]2.88	[e]2.88	[e]2.83	[e]3.18	[b]2.48
Tacoma, Wash ... a	2.65	3.40	2.95	2.75	2.25	2.25	3.40	2.60	3.10	2.98	2.98	2.74	2.90	2.93	2.63	2.38	3.05	3.05	2.75	2.75	2.94	....	2.71	2.71	2.73	3.08	2.41
Toledo, Ohio ... oo	[10d]3.12	[d]3.38	[d]3.27	[d]3.09	[d]2.39	[d]2.22	[d]3.38	[d]2.52	[d]3.27	[d]3.38	§[d]3.10	[d]3.27	[d].327	[dm]3.30	[24d]2.89	[d]2.67	[d]3.27	[d]3.27	[10]2.80	[10]2.80	[10]2.93	*	[ee]3.06	[ee]3.06	[ee]2.56	[ee]3.20	§2.16
Topeka, Kans ...	2.48	3.25	2.91	2.77	1.70	1.70	3.25	....	3.00	3.25	2.75	2.60	2.63	3.00	[25]2.28	§2.25	2.90	3.00	§2.30	2.30	2.71	*	2.30	2.70	....	2.70	....
Trenton, N J ...	3.15	[eee]3.48	[hhggg]3.85	....	2.15	2.15	....	....	[eee]3.48	....	....	[eee]3.48	3.15	[em]3.64	2.73	....	[e]3.50	[e]3.50	[ee]3.25	....	[ee]3.50	....	....	....	....	....	....
Tulsa, Okla ... pp	2.73	3.45	2.78	2.78	1.70	1.25	3.45	1.85	3.30	2.75	2.75	2.88	3.30	§3.00	2.70	....	3.07	3.07	2.30	....	2.75	....	2.40	2.40	2.13	2.40	1.95

NOTE: Rates rounded to nearest cent * Same as craft doing work ‡ 7-hr day # 6-hr day § Negotiating [1] eff 9/1/54 [2] Brush. Spray $2.50 [3] House. Struct steel $2.55 [4] Comp. Slate & tile $2.48 [5] Up to 4 cy. Over 4 cy $1.93 [6] eff 10/1/54 [7] Spray.. House $2.50, bridge $3.00, steel & indus $2.75 [8] Res. Com'l $2.65, indus $2.75 [9] Comp. Slate & tile $3.00 [10] 5¢ incr 11/1/54 [11] Brush. Spray $2.90 [12] Under 4 cy. Over 4 cy $2.10 [13] Slate. Comp. $3.25 [14] Brush. Spray $2.75 [15] Comp. Slate $2.00 [16] Brush. Spray $2.66 [17] Flatbed & pickup [18] This work done out of Birmingham [19] 1½–3 tons. 3½–5 tons $1.58 [20] Brush. Spray $3.18 [21] Comp. Slate & tile $2.80 [22] 3–5 tons dump [23] Comp. Slate & tile $2.90 [24] Brush. Spray $3.19 [25] Brush. Spray $2.70

RANGES: [A] 1.00–1.20 [B] 1.65–2.15 [C] 2.45–2.60 [D] 3.10–3.25 [E] 2.43–2.93 [F] 2.51–2.67 [G] 2.60–2.75 [H] 2.50–2.62 [I] 2.42–2.52 [J] 2.25–2.55 [K] 2.60–2.90 [L] 2.05–2.60 [M] 1.45–2.63 [N] 2.15–2.25 [O] 1.30–1.45 [P] 1.00–3.00 [Q] 2.61–2.97 [R] 0.75–1.00 [S] 0.90–1.25 [T] 1.65–1.85 [U] 1.50–1.75 [V] 1.75–2.00 [W] 1.60–1.75 [X] 2.43–2.87 [Y] 2.87–3.13 [Z] 2.05–2.40 [AA] 1.83–2.03

BENEFITS: [a] Incl 10¢ H&WF [b] Incl 7½¢ WF [c] Incl 5¢ WF [d] Incl 7¢ WF [e] Incl 10¢ WF [f] Incl 15¢ WF [g] Incl 6¢ WF [h] Incl 12¢ WF [i] Incl 11¢ WF [j] 10 PH [k] 8 PH [l] Incl 8¢ VF [m] Incl 1% PF [n] 7 PH [o] Incl 22½¢ WF [p] Incl 6% WF [q] Incl 10¢ PF [r] Incl 9¢ WF, 15¢ PF [s] Incl 1% WF [t] Incl 16¢ WF [u] Incl 8½¢ WF [v] Plus $2/wk WF [w] Incl 10¢ Ins [x] Incl 5¢ PF [y] Incl 27½¢ WF [z] Incl 6¢ VF [aa] Incl 8¢ WF [bb] Incl 4% VF [cc] Incl 6% VF [dd] 1 wk vac [ee] 6 PH [ff] Incl 3¢ PF [gg] Incl 3¢ WF [hh] Incl 7½¢ PF [ii] Incl 2% WF [jj] Incl 7½¢ H&WF [kk] Plus 70¢/day H&WF [ll] Incl 8¢ H&WF [mm] 5 PH [nn] Incl 5¾¢ WF [oo] Plus 6 days health, 1 wk vac & up to $30/wk subsistence [pp] Incl 26¢ fringe benefit [qq] Incl 5% WF [rr] Incl 4% WF, 20¢ PF [ss] Incl 3% WF, 3% PF [tt] Incl 4% WF, 4% PF [uu] Incl 15¢ WF, 15¢ PF, 20¢ BF [vv] Incl 6% W&PF [ww] Incl 5% W&PF, 4% VF, 6 PH, 1% nat'l contrib, $4/day annuity contrib [xx] Incl 4% WF, 3% PF [yy] Incl 3% WF, 5% PF [zz] Incl 12% fringe benefit [aaa] Incl 3% WF, 3% PF, 2% VF, 1% EF [bbb] Incl 5% WF, 3% PF [ccc] Incl 3% WF [ddd] Incl 11¢ PF [eee] Incl 12½¢ WF [fff] Incl 17¢ WF [ggg] Incl 10½¢ WF, 7½¢ PF [hhh] Incl 1½% PF [iii] Incl 11½¢ WF [jjj] Incl 3% VF [kkk] Plus .50/day WF [lll] Incl 8½¢ VF [mmm] Incl 10¢ WF, 7½¢ PF, 12½¢ VF [nnn] Incl 7½¢ WF, 5¢ VF [ooo] Incl 9¢ WF, 12¢ VF [ppp] Incl 6½¢ VF

OVERTIME [**a**] DT [**b**] DT Sat & Sun [**c**] DT Sat, Sun & Hol [**d**] DT Sun & Hol [**e**] DT brick, iron, stone mas, plast, mos & ter, tile, lath, elec (new work), plumb, steamf; (DT Sat, Sun & Hol) carp, mas help, cement, sheet met, oper engr; (DT Sun & Hol) roof, waterp, tr dr [**f**] DT all but carp, lab, plast, cement, paint, glaz; (TH 5–9 PM & Sat) elec; (TH 5–12 PM Sat) plumb, steamf; (TH 1st 3 hrs) sheet met [**g**] DT all but lab, mas help, tr dr [**h**] DT brick, iron, stone mas, plumb, steamf, sheet met [**i**] DT all but (TH M-F 7–8 AM; 4:30–6 30 PM) lab, cement; (TH old work) paint; (DT Sun & Hol) glaz, hoist engr [**j**] DT all but (TH in excess 8 hr regular workday), iron, elect, sheet met, weld; (TH first 2½hrs) lab, mas help; (TH 4:30–7 PM) cement; (DT Hol) paint, glaz; (TH up to 4:30 PM Sat) plumb; (TH first 2 hrs) roof, waterp; (TH before & after std workday) steamf [**k**] DT all but oper engrs, tr dr [**l**] DT all but lab, paint, tr dr; (TH up to 4:30 PM) roof, waterp [**m**] DT all but lab, mas help, mos & ter, tile, cement, paint, glaz, roof, waterp, tr dr [**n**] DT brick, iron, stone mas, plast, cement, elec, hoist engrs [**o**] DT all but lab, elec, paint, glaz, roof, waterp, tr oper, shov oper, tr dr; (DT Sun) carp; (DT Sat & Sun) cement [**p**] DT all but lab, cement [**q**] DT carp, brick, iron, stone mas, plast, mos & ter, lath, sheet met; (DT Sun & Hol) tr oper [**r**] DT carp, brick, iron, lab [**s**] DT all but (DT Sun & Hol) lab, mas help [**t**] DT all but (DT Sat, Sun & Hol) lab, cement, paint, glaz, tr dr [**u**] DT except lab, mas help, mos & ter, tile, paint, glaz; (DT Sat, Sun & Hol) elec [**v**] DT except lab, paint [**w**] DT all but (DT Sat, Sun & Hol) lab, mos & ter, tile, glaz, plumb, roof; (DT after 4:30 PM) cement; (DT after 10 PM) elec; (DT after 8 PM) sheet met [**x**] DT iron; (DT Hol) carp, lab, mas help, cement [**y**] DT except lab, mas help, mos & ter, tile, paint, glaz, oper engr, tr dr [**z**] DT except lab, mas help; (DT Sat & Sun) tile, paint, plumb, steamf, roof, waterp, tr dr [**aa**] DT except lab, mos & ter, paint, glaz, roof, waterp, sheet met, oper engrs, tr dr [**bb**] DT carp, paint, plumb, steamf, roof, waterp [**cc**] DT brick, iron, oper engrs [**dd**] DT all but (DT Sat, Sun, Hol) iron, mas help, cement, tr dr [**ee**] DT except (TH) elec [**ff**] DT brick, iron, stone mas, plast, mos & ter, tile, lath [**gg**] DT except lab, mas help, mos & ter, tile, paint, glaz, plumb, steamf, roof, waterp, sheet met [**hh**] DT except (DT Sun & Hol) lab [**ii**] DT brick, iron, tile, lath, steamf, waterp [**jj**] DT all but lab [**kk**] DT except (TH) cement, paint, (TH first 2 hrs) glaz, roof [**ll**] DT carp, brick, iron, stone mas, plast, mos & ter, tile, lath, sheet met, weld, oper engr; (DT Sat, Sun & Hol) cement, elec, plumb [**mm**] DT except (TH 1st 4 hrs) lab; (TH 1st 2 hrs) cement glaz, roof & waterp [**nn**] DT except cement, paint [**oo**] DT except (DT Sat, Sun) oper engrs [**pp**] DT all but lab, mas help, elect, paint, plumb, steamf

Union wages and hours

Trends in take-home pay and hours worked are measured by this annual survey by the Bureau of Labor Statistics, but not the fringe benefits. The 1954 study will not be available until next year. Rates shown here are minimum wage scales, or maximum work hours, agreed upon through collective bargaining between unions and employer bargaining groups.

The impact the various trades have on construction costs is:

Skilled construction craftsmen

Bureau of Labor Statistics

Craft	Number 1950	AFL members 1951*
All	1,920,000	....
Carpenters	734,000	750,000
Painters	293,000	208,187
Paperhangers	16,000	
Decorators	2,000	
Plumbers	173,000	201,343
Brickmasons	145,000	100,000
Electricians	98,000	500,000
Cement masons	27,000	37,300
Plasterers	56,000	
Excavators	74,000	....
Roofers	41,000	13,000
Sheet metal workers	30,000	32,000
Structural metal workers	29,000	125,000
Cranemen	13,000	....
Machinists	7,000	....
Stationary engineers	6,000	187,180
Automechanics	5,000	....
Cabinet makers	5,000	....
Boilermakers	4,000	150,000
Patternmakers	4,000	....
Linemen	4,000	....
Millwrights	3,000	....
Blacksmiths	2,000	....
Glaziers	2,000	....
Pressmen	1,000	....
Mechanics nec	55,000	....
Craftsmen nec	21,000	....
Foremen nec	58,000	....
Inspectors nec	7,000	....

nec: not elsewhere classified *Membership of AFL National and International units affiliated with the Building and Contruction Trades Department. In addition these are affiliated with B&CTD":

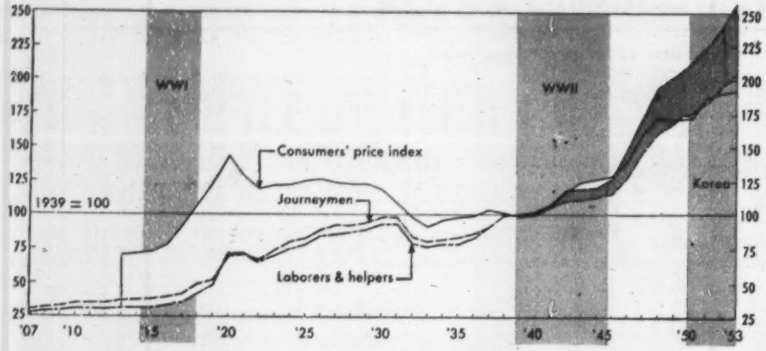
Craft and members	AFL 1951	Craft and members	AFL 1951
Lathers, wood, wire and metal	15,000	**Marble, slate and stone workers**	5,500
Elevator constr	10,000	**Stone cutters**	1,900
Asbestos workers	6,000	**Teamsters, chauff. warehousemen**	1,000,000
Granite cutters	4,000		

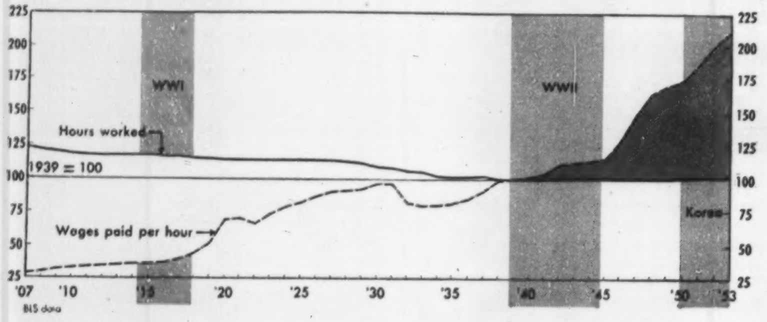
Work stoppages

Work stoppages due to labor-management disputes increased sharply in 1953, up 31% in number of stoppages (involving 6 or more workers and continuing a full day or shift or longer) and up 19% in number of man-days idle during the year. Workers involved numbered 574,000 in 1953 or 9% fewer than in '52 and 21.7% of construction wage earners compared with 24.1% the year before. Man-days idle during 1953 total 8 million and 1.22% of working time.

Since the record low during the war year 1944 the score has been:

Year	No of stoppages	No of workers	% of wage earners	No of man-days idle/yr	% of estim wrk time
1944	168	22,500	2.1	120,000	0.06
1945	206	45,800	4.0	447,000	0.20
1946	351	146,000	8.8	1,450,000	0.40
1947	382	175,000	8.8	2,770,000	0.66
1948	380	108,000	5.0	1,430,000	0.29
1949	615	197,000	9.1	2,760,000	0.53
1950	611	237,000	10.2	2,460,000	0.44
1951	651	232,000	9.0	1,190,000	0.18
1952	794	634,000	24.1	6,700,000	1.03
1953	1,039	574,000	21.7	8,000,000	1.22





Union labor trends, US Bu of Labor Statistics

Year	All Building Trades	Journeymen	Helpers & Laborers	Bricklayers	Carpenters	Cement Finishers	Electricians Inside Wiring	Glaziers	Lathers	Painters	Plasterers	Plumbers & Gas Fitters	Sheet Metal Workers	Steam & Sprinkl Fitrs	Stonemasons	Structural Ironworkers	Building Laborers	Bricklayers' Tenders
Wage rates per hour—Index, 1939 = 100																		
1907M	29.3	29.7	27.3	37.7	29.8	34.5	27.9	....	....	26.2	37.3	33.3	30.6	30.1	33.9	27.9	30.8	30.3
1913M	36.1	36.9	31.8	41.5	36.8	38.0	33.8	....	34.6	35.5	39.3	37.9	35.6	35.0	36.7	37.3	34.2	31.8
1926M	88.3	88.7	84.9	94.1	88.5	86.6	81.5	80.7	83.0	90.9	92.4	83.9	86.3	84.9	92.7	81.1	86.9	85.5
1930M	97.0	97.5	93.3	101.8	96.9	95.4	90.9	92.6	89.6	100.6	98.1	91.5	94.7	93.5	99.1	92.5	92.9	94.9
1932M	83.1	83.6	79.2	87.0	79.6	83.6	87.9	78.0	80.0	85.3	81.4	80.5	83.4	81.0	88.4	81.0	78.7	78.4
1938J	99.3	99.3	99.2	99.5	99.8	99.6	99.5	99.3	96.8	99.2	99.2	99.1	98.6	99.3	99.7	98.9	99.4	99.7
1942	111.9	110.9	117.5	108.3	112.1	110.8	113.5	108.8	109.1	110.5	105.0	110.5	116.0	109.3	108.0	108.7	119.6	115.7
1946	129.3	126.8	146.3	125.6	129.7	128.2	124.9	123.4	124.2	127.3	119.0	123.2	133.0	124.6	126.5	121.4	152.2	141.7
1948	163.5	159.4	192.7	165.6	164.7	161.1	154.4	155.5	157.8	154.4	148.2	158.2	164.4	154.3	166.0	151.9	200.8	185.5
1949	170.3	166.1	199.8	174.0	169.1	165.8	168.1	160.5	164.2	162.1	161.9	162.8	169.6	161.3	175.7	157.4	208.4	190.4
1950	177.8	173.2	210.8	180.4	177.4	172.7	172.3	169.4	179.6	167.7	169.3	166.7	177.9	168.3	187.1	164.8	220.0	203.4
1951	189.1	184.0	225.3	188.0	189.1	183.7	185.4	177.8	188.0	178.7	177.5	176.6	188.1	178.6	193.6	175.7	235.6	213.9
1952	200.8	195.3	240.0	203.9	200.6	192.2	196.0	186.0	194.4	190.2	187.6	187.0	202.2	189.1	207.5	184.0	251.7	228.0
1953	211.2	204.9	256.6	210.0	211.1	203.8	204.0	199.1	203.4	199.5	194.8	193.8	211.5	197.9	210.9	194.5	270.8	240.0
Hours worked per week—Index, 1939 = 100																		
1907M	124.3	123.8	126.1	122.9	121.0	122.7	124.2	....	....	133.1	125.8	120.6	117.0	120.3	118.4	121.3	121.6	118.9
1913M	118.2	118.0	118.3	114.9	115.6	119.8	120.7	....	121.8	125.9	124.3	119.2	114.9	118.0	115.7	114.1	118.3	116.0
1926M	114.9	115.1	113.9	113.3	113.5	113.4	115.9	117.5	118.9	120.7	118.2	116.5	111.8	114.4	114.5	112.8	112.1	113.9
1930M	109.8	110.0	109.0	107.1	109.4	108.1	109.9	112.4	110.4	115.4	113.0	109.9	106.9	108.5	107.1	108.8	110.0	106.9
1932M	106.5	106.6	105.7	103.1	105.0	105.6	106.2	107.9	109.3	114.2	110.1	108.0	103.6	106.4	104.8	104.8	104.9	104.0
1938J	100.2	100.1	100.2	99.0	100.0	100.0	100.2	100.2	100.8	110.4	100.0	99.7	100.0	99.6	100.1	100.1	100.1	100.3
1942	101.1	101.8	98.8	100.8	100.8	100.6	104.5	102.0	102.5	106.5	102.0	99.9	100.9	102.2	100.2	101.1	98.8	98.6
1946	100.2	101.1	97.5	100.3	100.3	100.4	100.4	102.0	102.2	106.1	104.1	98.3	100.8	101.3	100.0	101.1	97.2	96.9
1948	100.1	101.0	97.4	100.5	100.2	100.0	100.4	103.5	98.1	106.2	102.9	97.6	100.1	101.3	101.0	101.1	97.2	96.4
1949	100.2	101.1	97.4	100.1	100.2	100.0	102.1	103.5	98.1	106.2	103.5	97.6	99.9	101.3	100.8	101.1	97.2	96.4
1950	100.3	101.2	97.4	100.1	100.2	100.0	102.1	103.5	100.2	106.2	105.9	98.2	99.9	101.3	100.8	101.1	97.2	96.4
1951	100.2	101.1	97.3	100.2	100.2	100.0	102.1	103.5	100.2	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.0	96.2
1952	100.2	101.1	97.5	100.2	100.2	100.0	101.1	103.5	100.2	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.1	96.3
1953	100.2	101.1	97.5	100.2	100.2	100.0	101.1	103.5	100.3	104.9	105.9	98.2	99.9	101.3	100.9	101.1	97.1	96.3

*** M May 1. * J June 1. * All others July 1.**

Average wage rate increase in 85 cities—January to July

Trade	Per cent 1Q '53	Per cent 1Q '54	Per cent 2Q '53	Per cent 2Q '54	Cents per hour 1Q '53	Cents per hour 1Q '54	Cents per hour 2Q '53	Cents per hour 2Q '54	Rates, July 1, 1953 Low	Rates, July 1, 1953 Aver	Rates, July 1, 1953 High	Rates, July 1, 1954 Low	Rates, July 1, 1954 Aver	Rates, July 1, 1954 High
Bricklayers	0.1	0.2	1.7	2.3	0.4	0.7	5.5	7.6	$2.50	$3.29	$3.65	$2.50	$3.39	$3.80
Carpenters	0.2	0.2	2.7	1.3	0.7	0.5	7.3	3.8	2.05	2.81	3.40	2.10	2.89	3.50
Electricians	0.6	0.3	2.2	1.5	1.6	0.8	6.5	4.6	2.30	3.00	3.50	2.45	3.09	3.50
Painters	0.3	0.9	3.9	1.2	0.8	2.4	9.9	3.4	1.65	2.71	3.05	1.75	2.77	3.13
Plasterers	0.3	0.1	1.1	0.9	0.9	0.3	3.4	2.9	2.25	3.21	3.65	2.25	3.27	3.75
Plumbers	0.3	0.1	1.4	2.0	0.9	0.4	4.2	6.1	2.50	2.97	3.30	2.50	3.12	3.50
Bldg laborers	0.5	0.4	3.4	2.3	0.8	0.8	6.2	4.4	0.90	1.87	2.59	0.90	1.94	2.70

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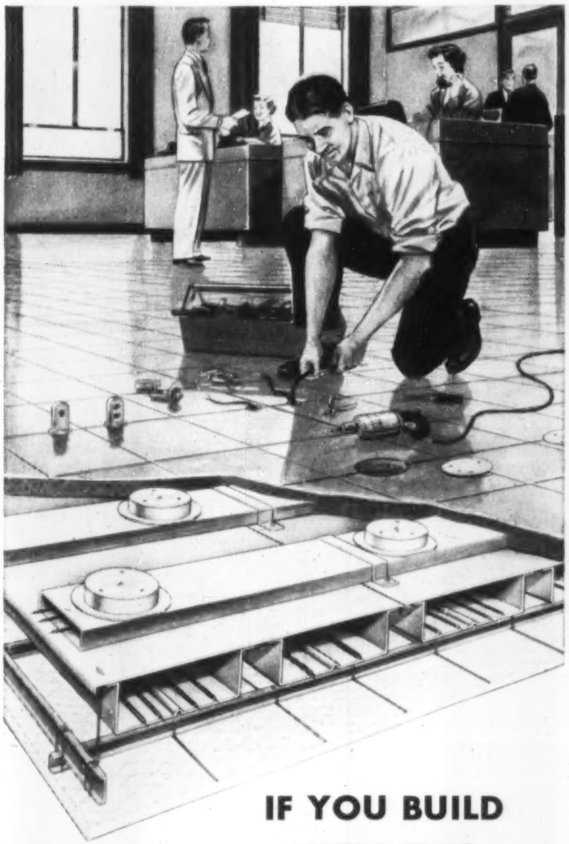

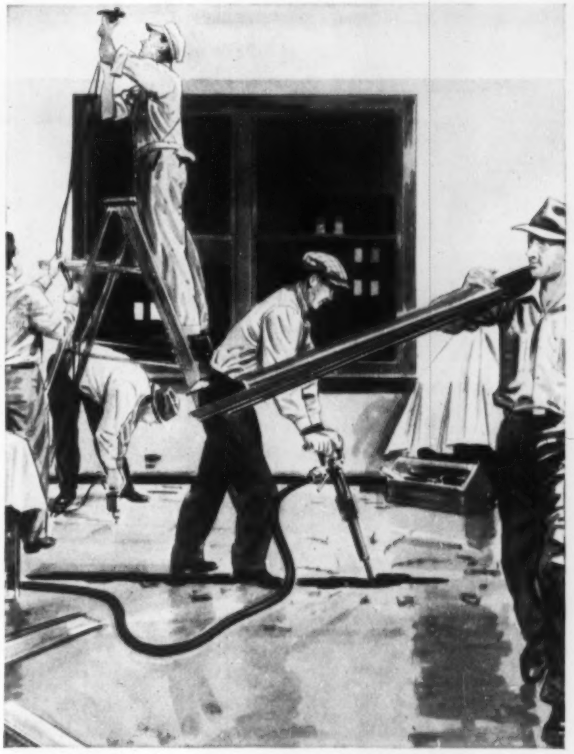

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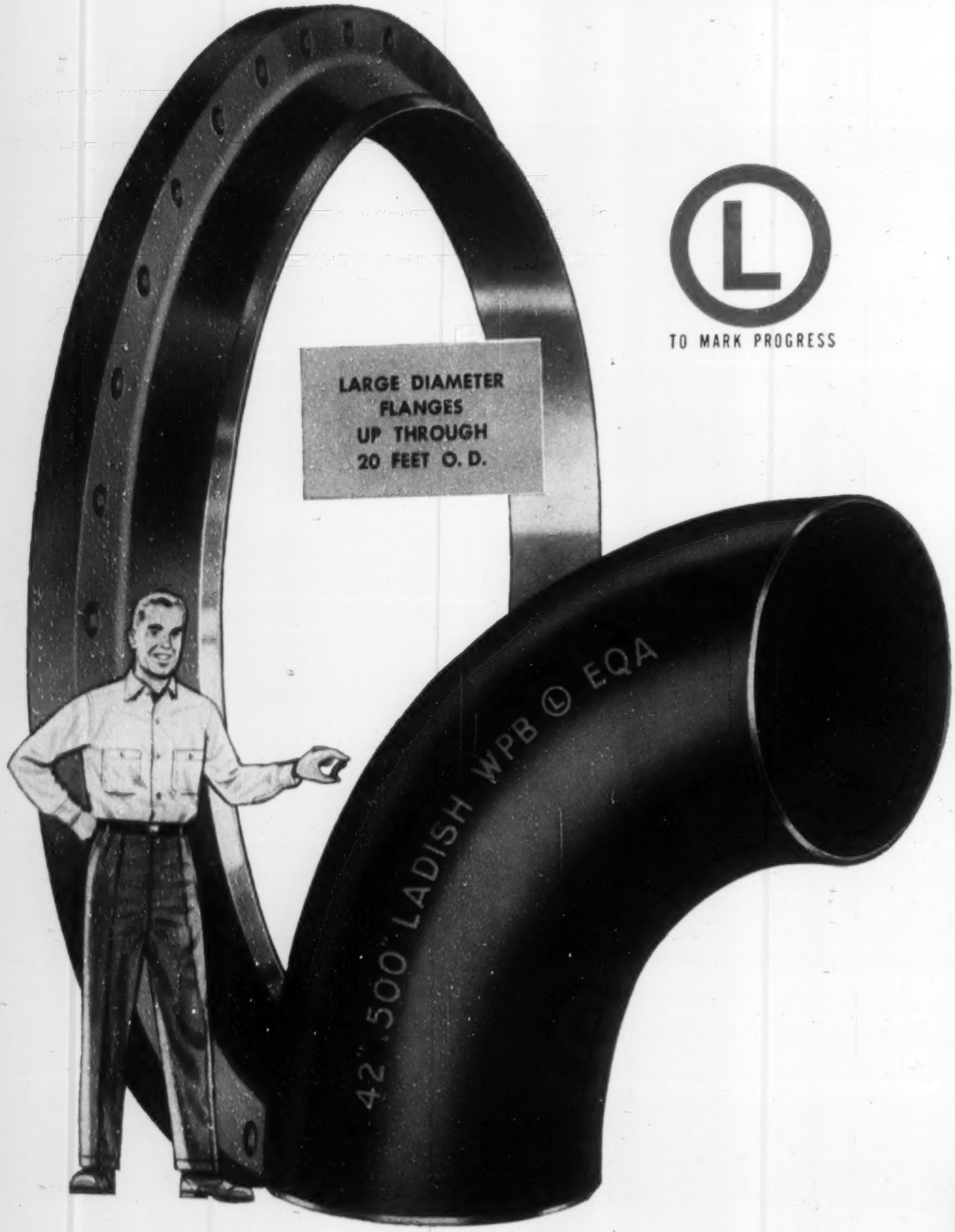
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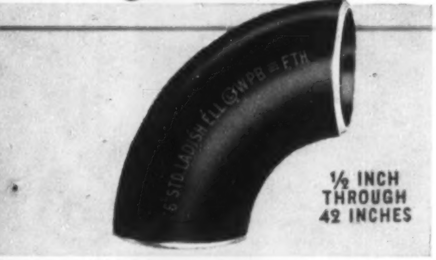
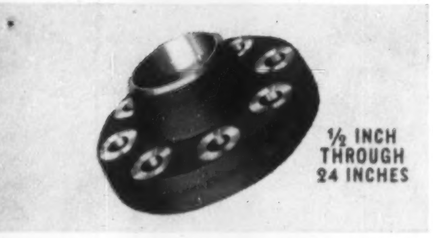
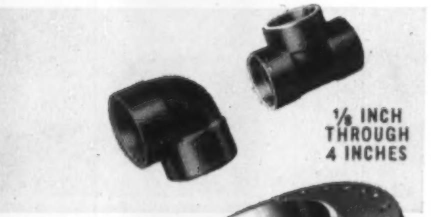


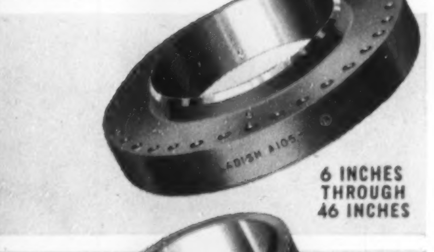
½ INCH
THROUGH
42 INCHES



½ INCH
THROUGH
24 INCHES



⅛ INCH
THROUGH
4 INCHES



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THROUGH
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THROUGH
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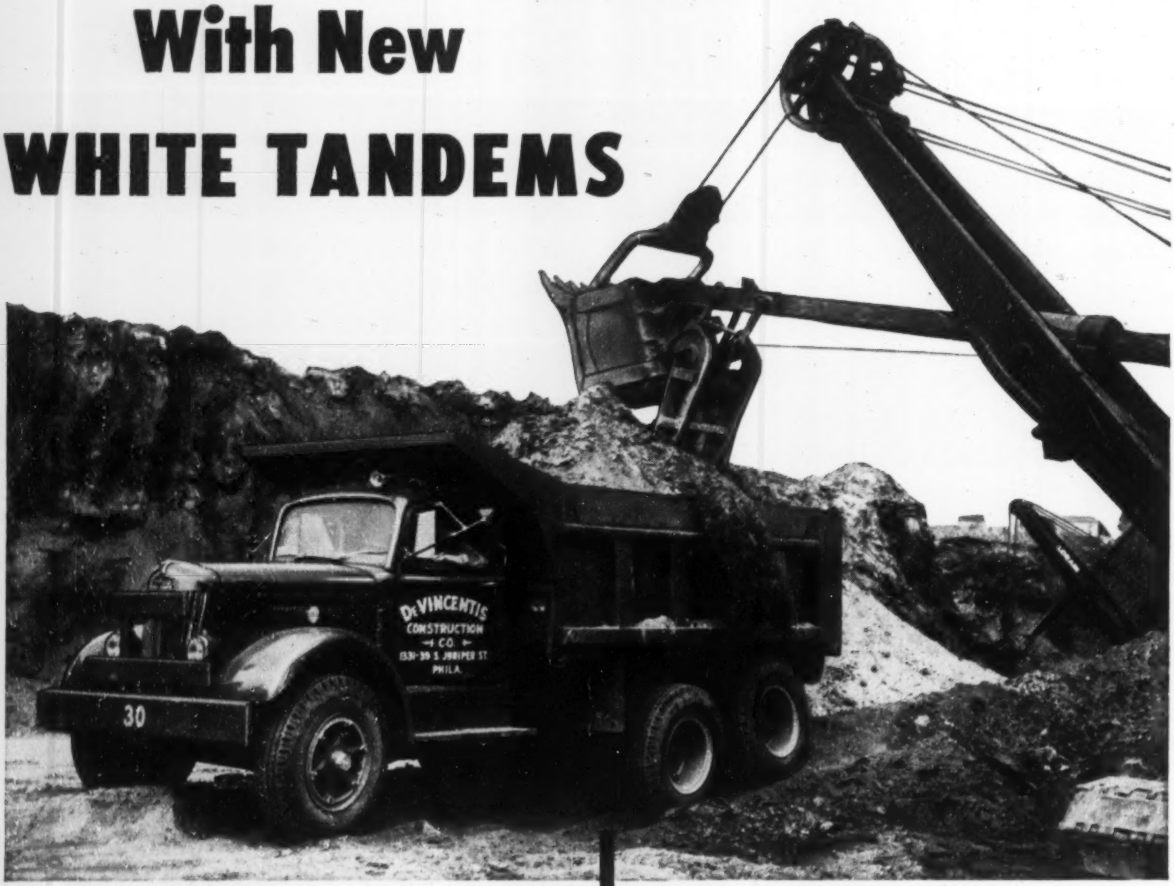
Boost Payload, Get Rugged Power With New WHITE TANDEMS



WHITE TANDEMS are really on the move . . . wherever building materials need to be moved!

Their rugged power and ability to take it speeds hauling, grading and excavating. They last longer on the tough jobs, the big loads!

But the big extra which is exclusively White is the payload earning power . . . the extra profit because of White Specialized Design.

Tailored to exact working conditions, White Tandems get *more* work done . . . in *less* time . . . at *lower* cost.

You are losing money by the truckload if you delay getting facts from your White Representative.

Doubles Payload by Switching to WHITE Tandem Dump Units

**. . . DE VINCENTIS CONSTRUCTION CO.
Philadelphia, Pa.**

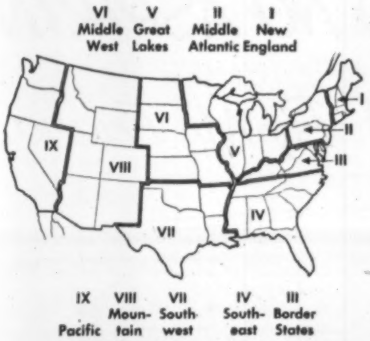
This White Model WC-2264 Tandem has nine cu. yd. dump body. It's light enough to carry 13-tons of building materials within legal limits . . . rugged enough for the tough "off-highway work" . . . powerful enough to improve your schedule time.

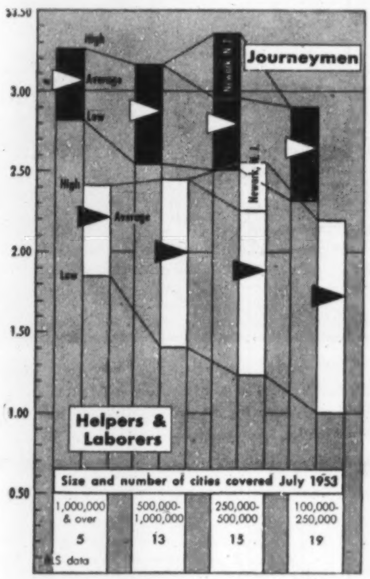
White

THE WHITE MOTOR COMPANY
Cleveland 1, Ohio

For More Than 50 Years The Greatest Name In Trucks

Average union wages, building trades, by area





Bureau of Labor Statistics, July 1, 1953

Trade	United States	I New England	II Middle Atlantic	III Border States	IV Southeast	V Great Lakes	VI Middle West	VII Southwest	VIII Mountain	IX Pacific
All building trades	$2.69	$2.48	$2.91	$2.50	$2.17	$2.83	$2.67	$2.33	$2.37	$2.68
Journeymen	2.88	2.70	3.16	2.76	2.49	2.97	2.83	2.62	2.62	2.77
Asbestos workers	2.93	2.76	3.14	2.83	2.67	3.03	2.80	2.79	2.68	2.88
Boilermakers	2.98	2.75	3.29	2.94	2.75	3.05	2.90	2.75	2.85	2.90
Bricklayers	3.28	3.04	3.45	3.21	2.98	3.25	3.39	3.31	3.23	3.27
Carpenters	2.81	2.56	3.16	2.63	2.29	2.94	2.75	2.46	2.47	2.67
Cement finishers	2.79	3.01	3.15	2.53	2.29	2.84	2.82	2.47	2.55	2.69
Electricians (inside wiremen)	3.00	2.78	3.26	2.86	2.71	3.07	2.87	2.84	2.84	2.97
Elevator constructors	3.00	2.86	3.21	2.97	2.72	3.03	2.90	2.87	2.87	3.02
Glaziers	2.57	2.43	2.71	2.50	2.15	2.74	2.61	2.25	2.27	2.48
Lathers	3.14	3.00	3.24	3.09	2.61	3.11	2.92	3.18	3.12	3.18
Machinists	2.72	2.75	3.25	2.85	2.50	2.97	2.88	2.19	2.78	2.73
Marble setters	2.96	2.81	3.10	3.07	2.82	2.97	2.88	2.78	2.77	2.86
Mosaic and terrazzo workers	2.91	2.77	3.11	2.90	2.85	2.87	2.93	2.61	3.13	2.82
Painters	2.69	2.37	2.78	2.46	2.30	2.79	2.63	2.39	2.31	2.75
Paperhangers	2.65	2.48	2.59	2.24	2.43	2.81	2.56	2.30	2.34	2.72
Plasterers	3.21	3.03	3.43	3.15	2.58	3.15	3.09	3.02	3.17	3.36
Plumbers	2.97	2.79	3.21	2.81	2.71	2.99	2.95	2.82	2.86	2.87
Rodmen	2.76	3.03	3.19	2.69	2.35	2.91	2.85	2.40	2.67	2.63
Roofers, composition	2.68	2.62	2.99	2.28	2.03	2.81	2.60	2.20	2.68	2.63
Roofers, slate and tile	2.72	2.84	2.98	2.62	2.10	2.94	2.60	2.29	2.47	2.65
Sheet-metal workers	2.81	2.78	3.08	2.70	2.49	2.90	2.94	2.59	2.63	2.70
Steam and sprinkler fitters	2.98	2.77	3.25	2.78	2.71	3.03	2.95	2.80	2.91	2.90
Stonemasons	3.19	3.05	3.18	3.28	3.15	3.16	3.23	3.33	3.25	3.24
Structural-iron workers	2.96	3.06	3.23	3.04	2.59	3.01	2.87	2.65	2.70	2.80
Tile layers	2.97	2.80	3.18	2.90	2.65	2.97	2.88	2.69	2.79	2.96
Helpers and laborers	1.95	1.88	2.14	1.66	1.28	2.17	1.99	1.38	1.92	2.15
Bricklayers' tenders	2.12	1.89	2.33	1.60	1.17	2.22	2.09	1.51	2.19	2.48
Building laborers	1.86	1.86	2.02	1.63	1.29	2.13	1.93	1.30	1.78	2.04
Composition roofers' helpers	1.81	1.88	1.90	1.71	1.25	1.94	1.95	1.43	....	2.00
Elevator constructors' helpers	2.14	2.01	2.33	2.09	1.91	2.11	2.10	2.03	2.01	2.11
Marble setters' helpers	2.09	1.97	2.20	2.07	1.23	2.32	1.92	1.39	2.05	2.27
Plasterers' laborers	2.18	2.04	2.41	1.86	1.31	2.30	2.32	1.57	2.20	2.91
Plumbers' laborers	1.97	....	2.13	1.68	1.22	2.24	2.09	1.33	2.01	2.12
Terrazzo workers' helpers	2.27	1.95	2.46	1.93	1.23	2.37	2.05	1.42	1.93	2.34
Tile layers' helpers	2.19	1.99	2.35	2.03	1.02	2.25	1.97	1.47	2.06	2.25

Geographically union wages in the building trades are highest in the middle Atlantic states, lowest in the Southeast where they also increased the least (.9%) in 1953. They increased most (5.9%) in the Pacific states with the Mountain states runners-up.

Average hourly earnings on contract construction

Bureau of Labor Statistics, dollars per hour

	Building*						Non building*						Manufacturing					
	1946	1949	1950	1951	1952	1953	1946	1949	1950	1951	1952	1953	1946	1949	1950	1951	1952	1953
Jan	$1.40	$1.92	$1.98	$2.13	$2.26	$2.41	$1.30	$1.71	$1.75	$1.90	$2.06	$2.18	$1.00	$1.41	$1.42	$1.55	$1.64	$1.74
Feb	1.42	1.93	1.99	2.15	2.27	2.42	1.30	1.71	1.77	1.92	2.06	2.19	1.00	1.40	1.42	1.55	1.64	1.74
Mar	1.41	1.93	2.00	2.16	2.28	2.44	1.28	1.70	1.77	1.93	2.07	2.20	1.04	1.40	1.42	1.56	1.65	1.75
Apr	1.42	1.93	1.99	2.16	2.27	2.44	1.31	1.71	1.75	1.95	2.08	2.18	1.06	1.40	1.43	1.57	1.65	1.75
May	1.43	1.93	2.00	2.18	2.26	2.44	1.31	1.71	1.76	1.95	2.05	2.19	1.07	1.40	1.44	1.58	1.65	1.76
June	1.44	1.92	2.00	2.19	2.25	2.44	1.31	1.70	1.76	1.98	2.06	2.19	1.08	1.41	1.45	1.59	1.65	1.77
July	1.47	1.92	2.01	2.19	2.28	2.47	1.36	1.71	1.78	1.98	2.07	2.22	1.09	1.41	1.46	1.59	1.65	1.77
Aug	1.48	1.93	2.02	2.20	2.31	2.49	1.35	1.71	1.79	2.00	2.13	2.26	1.11	1.40	1.46	1.59	1.67	1.77
Sept	1.51	1.94	2.07	2.23	2.35	2.52	1.37	1.73	1.83	2.02	2.16	2.28	1.13	1.41	1.48	1.61	1.69	1.79
Oct	1.53	1.94	2.08	2.23	2.38	2.54	1.40	1.74	1.83	2.04	2.19	2.31	1.14	1.39	1.50	1.61	1.70	1.79
Nov	1.55	1.95	2.09	2.25	2.39	2.55	1.43	1.75	1.84	2.05	2.18	2.31	1.15	1.39	1.51	1.62	1.72	1.79
Dec	1.57	1.96	2.12	2.25	2.40	2.57	1.43	1.78	1.88	2.04	2.18	2.30	1.16	1.41	1.54	1.63	1.73	1.80

* Series revised March, 1948 to cover both public and private contract construction and to include workers engaged in off-site operations for construction as well as site workers. ** Discontinued after 1953.

Work injury rates

Injuries cost money, directly in compensation insurance rates and indirectly in work slow-downs. Permanent total construction injuries increased 12.5% in 1952 (1953 figures are not available). Permanent partial injuries decreased 13% and temporary total increased 3/10%.

Work injury rates in contruction, 1951-52

Bureau of Labor Statistics

	Number estabs reporting	Injury [a] frequency		1952 Severity [b] rate	Aver days lost [d]	1952 Injuries resulting in		
		1952	1951			Perm total [c] %	Perm partial %	Temp total %
Construction	5,174	34.6	39.3	3.7	105	0.9	2.7	96.4
General contractors	2,519	35.4	42.9	3.8	109	1.0	2.9	96.1
Genl bldg contrs	1,705	38.1	39.6	2.7	71	0.5	2.2	97.3
Hvy constrn	274	26.2	42.3	4.5	174	1.7	4.8	93.5
Hwy & street	540	46.0	50.8	5.1	112	1.2	2.4	96.4
Spec-trade contr	2,655	32.7	31.5	3.2	95	0.8	2.1	97.1
Plumb, heat, air cond	683	31.3	26.8	0.8	26	0.1	0.8	99.1
Paint & decor	356	23.6	23.5	4.3	183	2.8	0.5	96.7
Electrical	359	30.6	25.7	1.7	55	0.6	1.6	97.8
Masonry	199	33.1	40.7	2.5	74	0.5	1.5	98.0
Plaster & lath	87	36.8	38.2	n.a.	n.a.	n.a.	n.a.	n.a.
Trzo, tile, marble	71	22.4	23.9	n.a.	n.a.	n.a.	n.a.	n.a.
Roof & sheet-met	254	38.0	43.7	2.1	55	0.2	1.9	97.9
Struct steel erect	60	46.9	48.2	13.8	295	2.3	6.7	91.0
Instal bldg equip	31	22.0	29.6	n.a.	n.a.	n.a.	n.a.	n.a.
Misc spec-trade contrs	555	35.9	39.0	2.5	69	0.4	1.7	97.9

*[a] average number of disabling work injuries per million employee-hours worked. *[b] average number of days lost for each 1,000 employee-hours worked *[c] permanent total, including death *[d] charged to each case

per week & hours worked

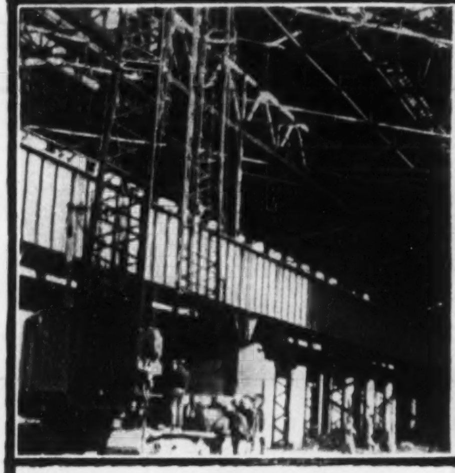
	1953		Apr. 1954	
	Earn/wk	Hrs/wk	Earn/wk	Hrs/wk
All contr const	$91.61	37.7	$92.87	37.0
Building	91.76	37.0	94.17	36.5
General	87.75	37.5	89.55	36.7
Spec trade	95.05	36.7	97.28	36.3
Plumb & heat	98.30	38.1	101.41	37.7
Paint & decor	87.10	34.7	89.27	34.6
Electrical	111.61	39.3	110.98	38.4
Other	91.04	35.7	93.10	35.4
Masonry	85.77	33.9	**	**
Plaster & lath	96.28	33.2	**	**
Carpentry	79.81	34.7	**	**
Roof & sheet-met	80.13	35.3	**	**
Excav & found	89.63	38.8	**	**
Non-building	90.27	40.3	89.60	39.3
Highway & street	85.28	41.2	82.53	39.3
Other	93.85	39.6	94.71	39.3

Average earnings on construction continue to gain. They were up 4.3% in 1953 from '52 and 4.9% in April 1954 from April '53.

60,000 TONS OF STEEL AND NO ASPIRIN!

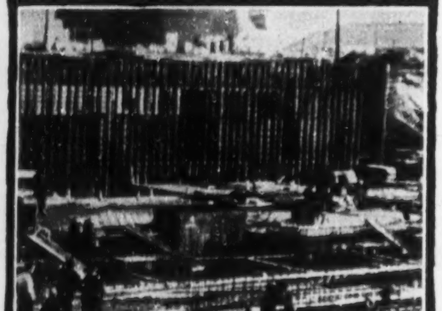
(A brief case)

By Mr. Friendly



Raising steel, unloaded by G. & H., for construction of open hearth furnaces. Reinforcing in foundations of this huge building also placed by G. & H.

G. & H. unloaded the steel for this Ore Unloader on the river front and also placed reinforcing in piers, abutments and foundations.



Placing reinforcing for foundation and mats in bar mill of the Fairless Works of the U. S. Steel Company at Morrisville, Pa., where G. & H. Steel Service, Inc., of Drexel Hill, Pa., handled over 60,000 tons of steel and placed over 45,000 tons of reinforcing steel in various structures.

What, no aspirin?

Absolutely not! There were no throbbing heads among the management of G. & H. because they were able to handle this large tonnage of steel with practically no injuries. That's been their story in the 20 years they've insured with American Mutual! Working closely with our safety engineers over these years, and using the recommendations of experts trained in accident control, G. & H. has been able to operate consistently with a minimum of accidents.

If you are interested in a service that can help you cut down on aspirin, traction splints and high insurance premiums, write for your free copy of "Foremanship and Accident Prevention in Construction," American Mutual Liability Insurance Company, Dept. O-130, 142 Berkeley Street, Boston 16, Mass.

AMERICAN MUTUAL

Service from salaried representatives in 78 offices!
Savings from regular substantial dividends!

©1954, AMERICAN MUTUAL LIABILITY INSURANCE COMPANY

Base rates on compensation insurance for construction

Herbert L. Jamison & Co., Insurance Advisers and Auditors, New York, N. Y.—(Base rates in effect July 1, 1954—subject to increase or decrease according to experience ratings)

Classification of work	Ala.	Alas.	Ariz.	Ark.	Calif.	Colo.	Conn.	Del.	D. C.	Fla.	Ga.	Idaho	Ill.	Ind.	Iowa	Kans.	Ky.	La.	Me.	Md.	Mass.	Mich.	Minn.	Miss.	Mo.
Carpentry—1-2 family residences	$1.10	$3.47	$4.44	$2.79	$2.47	$1.99	$3.48	$1.55	$2.58	$2.78	$1.49	$3.46	$2.16	$1.65	$1.41	$1.89	$1.57	$3.61	$1.74	$1.97	$3.65	$2.16	$2.57	$2.65	$2.07
Carpentry—3 stories or less	1.17	3.95	4.44	2.79	4.18	2.11	4.09	1.55	2.61	2.78	1.49	3.46	2.67	1.94	2.05	1.99	1.89	4.16	1.74	1.99	4.53	2.16	2.57	3.06	2.59
Carpentry interior trim, cabinet work	.63	2.34	4.44	1.47	4.18	.98	2.38	1.55	1.94	2.52	1.05	1.70	1.42	.89	.88	1.14	1.05	2.27	1.00	1.47	2.01	1.60	3.89	1.88	2.82
Carpentry general	1.79	7.94	4.44	3.93	4.18	2.64	5.73	1.55	2.78	4.16	3.52	6.34	3.95	2.52	2.36	3.02	2.91	4.89	3.44	3.35	10.44	2.16	3.89	6.11	2.82
Chimney construction, brick, concrete	4.72	12.22	9.74	10.30	12.79	7.53	15.63	A	13.28	13.35	A	14.45	8.73	6.93	5.86	9.33	9.14	16.67	6.72	9.90	6.99	8.92	10.78	13.16	13.59
Concrete work—bridges—culverts—C	2.66	A	7.10	4.44	5.18	4.10	7.77	1.35	7.87	4.97	4.36	7.63	4.40	3.20	3.19	4.07	3.45	6.63	4.80	5.36	8.14	3.55	5.73	7.15	6.71
Concrete work—3 stories or less—C	.63	6.75	3.51	1.13	1.06	1.16	4.02	1.35	3.48	2.79	.88	2.75	1.74	1.03	1.12	1.91	1.15	2.01	1.76	1.70	5.24	1.27	1.84	1.98	1.77
Concrete work—general—C	.88	7.14	3.51	2.56	2.98	2.42	5.78	1.35	4.00	3.45	2.20	4.82	3.26	1.86	1.93	3.14	2.59	6.53	2.18	2.83	7.77	1.99	2.88	2.89	4.04
Concrete or cement walks, floors, yards	.65	2.76	3.51	1.35	A	1.03	2.87	1.55	1.53	2.45	1.42	2.10	1.49	.94	1.03	1.89	1.11	2.46	1.25	2.62	2.59	1.05	1.48	2.04	1.92
Electrical wiring	.89	1.83	2.41	1.39	1.59	1.11	1.72	.90	1.92	1.84	1.43	1.92	1.29	1.09	1.00	1.19	.98	2.05	.93	1.63	2.14	1.12	1.16	1.46	1.18
Excavation—earth—D	1.32	3.82	3.26	3.41	2.74	2.76	3.94	1.55	3.61	3.51	2.02	5.82	2.37	1.59	1.81	3.23	2.71	3.17	3.12	3.16	5.67	2.02	3.64	3.44	2.90
Excavation—rock—E	2.05	9.09	5.63	4.91	5.55	4.82	10.05	2.00	6.05	6.44	4.21	6.75	4.67	3.19	2.71	4.36	3.84	8.13	3.32	4.57	10.35	3.98	5.31	5.94	6.27
Glazing	1.79	4.33	3.77	3.72	3.31	2.67	5.91	1.00	4.50	3.87	2.90	5.06	3.24	2.18	2.36	3.25	3.06	4.81	2.69	3.64	5.55	2.85	4.21	4.75	3.58
Insulating	.70	3.50	A	1.55	2.49	1.28	2.44	A	2.27	1.74	.87	2.85	1.68	1.15	1.26	1.46	1.35	2.96	1.68	1.45	3.69	1.04	2.81	2.37	1.57
Lathing	.83	3.50	1.89	1.94	1.65	1.30	3.07	.65	2.09	1.91	1.40	2.32	1.52	1.20	1.14	1.50	1.40	2.96	1.32	1.76	2.84	1.09	1.68	2.48	1.97
Masonry	.63	5.95	2.96	1.13	2.11	1.16	3.72	.80	2.10	2.10	.88	2.75	1.76	1.15	1.12	1.91	1.15	2.01	1.76	1.57	5.24	1.36	1.66	1.98	1.72
Painting and decorating	1.13	4.77	3.16	1.53	2.69	1.84	4.49	1.60	3.17	3.59	1.89	3.93	2.06	1.99	1.36	1.62	2.03	2.80	1.94	2.84	B	1.73	1.90	2.98	3.22
Pile driving—building operations	4.23	9.10	8.40	9.97	9.51	7.27	6.92	4.40	9.11	8.79	6.69	12.97	7.20	4.21	4.38	8.54	6.93	14.96	3.33	6.62	9.74	4.77	7.76	11.30	9.71
Plastering	.70	3.50	3.67	1.55	1.65	1.28	2.44	.65	2.27	1.74	.87	2.85	1.68	1.15	1.26	1.46	1.35	1.94	1.68	1.45	3.26	1.04	1.81	2.37	1.57
Plumbing	.77	1.82	2.43	1.39	3.72	1.28	2.07	.80	2.04	1.79	1.45	2.04	1.54	1.06	1.11	1.29	1.09	2.27	.95	1.55	2.01	1.26	1.43	1.70	1.95
Roofing	2.85	8.95	4.92	6.14	6.86	4.54	8.34	1.30	5.61	4.85	4.16	9.71	6.30	4.91	5.99	5.77	3.81	5.09	4.57	6.72	18.48	4.10	5.58	5.27	5.40
Sheet metal work	1.08	3.04	3.11	2.33	2.35	1.47	2.73	1.30	2.33	2.69	2.07	2.90	1.86	1.55	1.43	1.60	1.60	2.83	1.42	2.27	2.56	1.41	1.52	3.16	2.08
Steel erection—door and sash	1.18	4.90	2.22	2.42	7.54	1.86	4.33	6.25	3.40	2.77	1.93	3.25	2.37	1.72	1.58	2.14	2.00	4.26	1.87	2.48	3.84	2.07	2.89	3.32	2.97
Steel erection—interior ornament	1.18	4.90	4.28	2.42	7.54	1.86	4.33	2.25	3.40	2.77	1.93	3.25	2.37	1.72	1.58	2.14	2.00	4.26	1.87	2.48	3.84	2.07	2.89	3.32	2.97
Steel erection—structural	4.82	19.60	16.28	10.61	11.04	11.47	19.26	6.25	21.35	12.75	10.60	19.54	8.83	6.11	9.81	10.30	10.32	12.67	8.66	9.82	21.91	12.00	9.68	10.97	12.44
Steel erection—dwellings—2 stories	3.01	10.77	5.43	5.94	7.54	4.70	10.26	6.25	7.02	7.32	4.82	9.37	6.67	3.29	3.77	5.56	5.32	8.78	4.88	6.10	12.97	4.17	7.03	8.54	7.63
Steel erection—general	3.80	11.05	16.28	8.12	7.54	7.64	11.39	6.25	14.21	10.79	7.16	13.87	7.55	4.55	6.34	5.93	5.38	12.67	6.21	7.44	15.48	4.19	8.07	10.97	5.30
Tile work—interior	.55	1.11	4.28	1.26	1.01	.84	1.95	.55	2.04	1.28	.82	1.45	.95	.76	.76	.98	.89	1.52	.90	1.13	2.01	1.00	1.40	1.60	1.06
Timekeepers and watchmen	1.24	5.95	F	2.28	F	1.89	4.56	G	2.96	3.45	2.05	3.35	2.67	1.74	1.67	2.22	1.98	4.39	1.94	2.55	4.53	2.03	2.99	2.92	3.51
Waterproofing—brush	1.13	4.77	3.16	1.53	2.69	1.84	4.49	.80	3.17	3.59	1.89	3.93	2.06	1.99	1.36	1.62	2.03	2.80	1.94	2.84	B	1.73	1.90	2.98	3.22
Waterproofing—trowel—interior	.70	3.50	3.67	1.55	1.65	1.28	2.44	.80	2.27	1.74	.87	2.85	1.68	1.15	1.26	1.46	1.35	1.94	1.68	1.45	3.26	1.04	1.81	2.37	1.57
Waterproofing—trowel—exterior	.63	5.95	2.96	1.13	2.11	1.16	3.72	.80	2.10	2.10	.88	2.75	1.76	1.15	1.12	1.91	1.15	2.01	1.76	1.57	5.24	1.36	1.66	1.98	1.72
Waterproofing—pressure gun	1.88	7.14	3.51	2.56	2.98	2.42	5.78	.80	4.00	3.45	2.20	4.82	3.26	1.86	1.93	3.14	2.59	6.53	2.18	2.83	7.77	1.99	2.88	2.89	4.04
Wrecking	6.35	15.99	28.43	14.37	17.93	11.17	20.24	9.75	16.41	12.81	8.91	20.08	10.68	5.44	9.00	9.02	11.16	17.00	10.87	14.91	21.59	10.77	12.11	16.47	14.73

Classification of work	Mont.	Neb.	Nev. G	N. H.	N. J.	N. Mex.	N. Y.	N. Car.	N. Dak. G	Ohio G	Okla.	Oreg.	Pa.	R. I.	S. Car.	S. Dak.	Tenn.	Texas	Utah	Vt.	Va.	Wash.	W. Vir. G	Wisc.	Wyo. G
Carpentry—1-2 family residences	$2.97	$2.27	$4.07	$2.14	$3.20	$3.80	$4.70	$1.88	$2.49	$1.74	$3.90	$4.63	$1.50	$3.54	$2.09	$1.22	$1.90	$2.74	$2.10	$2.24	$1.42	$4.08	$1.57	$2.73	$1.85
Carpentry—3 stories or less	2.97	2.27	4.07	2.14	3.10	3.84	4.70	1.88	2.49	2.04	4.90	4.63	1.50	4.75	2.47	1.22	1.90	4.01	2.10	2.24	1.42	4.08	1.89	3.89	1.85
Carpentry interior trim, cabinet work	1.34	1.13	1.84	1.24	1.44	1.83	4.70	1.41	3.76	.94	3.15	2.14	1.50	3.51	1.57	.88	1.21	2.22	2.10	.95	.84	1.33	1.05	2.73	1.85
Carpentry general	4.54	2.95	6.22	3.04	4.10	6.21	5.70	3.22	3.76	2.67	5.53	5.45	1.50	6.96	5.83	1.42	3.57	4.01	2.10	3.17	2.00	5.40	2.91	3.89	1.85
Chimney construction, brick, concrete	12.76	8.62	17.48	9.03	11.02	13.61	30.60	10.37	10.42	7.30	17.35	A	A	30.21	13.80	4.84	8.61	13.93	9.65	6.51	5.39	A	9.14	12.78	8.49
Concrete work—bridges—culverts—C	6.22	4.33	8.52	5.88	4.90	8.88	8.80	3.90	5.54	3.37	9.50	7.16	1.55	15.76	9.05	3.33	3.93	4.01	5.18	4.11	2.12	6.72	3.45	6.70	4.56
Concrete work—3 stories or less—C	2.20	1.35	3.01	2.49	3.20	2.29	6.60	1.64	1.78	1.09	3.83	4.24	1.55	4.93	1.34	1.08	1.10	4.01	2.11	2.11	.84	3.98	1.15	1.83	1.86
Concrete work—general—C	3.97	3.05	5.44	4.02	4.90	3.84	6.60	2.77	2.78	1.96	8.54	4.87	1.55	8.90	3.38	2.02	1.98	4.01	2.28	2.35	1.92	4.57	2.59	3.36	2.01
Concrete or cement walks, floors, yards	1.69	1.70	2.32	1.54	2.20	2.30	3.90	1.57	1.43	.99	2.65	2.32	1.75	3.95	2.09	1.05	1.20	2.30	1.53	1.18	.84	2.04	1.11	1.90	1.35
Electrical wiring	1.51	1.32	2.07	1.56	2.00	2.25	3.10	1.53	1.12	1.15	1.96	2.40	1.00	2.46	2.84	.92	1.20	1.95	1.43	1.03	.89	2.25	.98	1.53	1.26
Excavation—earth—D	4.61	2.80	6.32	3.05	3.50	5.53	6.90	2.00	3.52	1.68	6.30	5.43	1.75	8.68	2.73	1.83	2.02	3.15	2.73	2.55	1.75	4.79	2.71	3.20	2.40
Excavation—rock—E	5.28	4.16	7.23	4.44	8.60	6.32	12.60	6.57	5.13	3.36	7.98	A	2.80	13.38	6.75	2.94	5.03	7.77	3.70	3.29	3.74	9.32	3.84	6.48	2.90
Glazing	4.16	3.16	5.70	3.43	4.40	5.05	6.90	3.62	4.07	2.30	6.44	4.90	1.30	10.44	5.08	2.12	3.33	2.86	1.16	2.57	2.12	4.59	3.06	4.51	1.02
Insulating	2.31	1.48	3.16	2.02	2.95	3.60	5.60	1.24	2.72	1.21	4.56	4.16	B	5.18	2.21	1.35	1.11	2.41	2.68	1.51	.82	4.56	1.35	4.10	2.36
Lathing	1.92	1.51	2.63	1.65	1.90	2.46	3.20	1.74	1.62	1.26	2.49	4.16	.80	4.84	2.37	1.10	1.63	1.87	1.77	1.24	1.08	3.59	1.40	2.13	1.56
Masonry	2.20	1.35	2.36	2.49	3.50	2.29	6.00	1.64	1.61	1.21	2.31	4.24	1.00	4.93	1.34	1.08	1.10	4.01	1.38	2.11	.82	3.98	1.15	1.99	1.21
Painting and decorating	3.30	1.95	4.52	3.97	4.80	4.11	6.00	1.67	1.84	2.10	3.63	4.86	2.10	4.76	3.27	1.80	1.50	2.00	2.11	1.79	1.22	4.56	2.03	2.75	1.86
Pile driving—building operations	10.86	7.14	13.31	4.50	6.50	13.28	9.30	8.66	7.50	4.44	16.85	11.58	3.00	10.93	9.31	5.73	8.71	14.57	5.67	3.35	5.04	10.36	6.93	12.74	4.99
Plastering	2.31	1.48	3.13	2.02	1.90	3.60	5.00	1.24	1.75	1.21	2.89	4.16	.80	5.18	2.21	1.35	1.11	2.05	2.68	1.51	.82	3.50	1.35	2.06	2.36
Plumbing	1.59	1.25	2.14	1.90	2.25	2.33	3.80	1.51	1.38	1.12	2.60	2.12	.85	2.63	1.60	.99	1.10	2.18	1.53	1.19	.91	1.99	1.09	1.76	1.35
Roofing	8.03	7.08	11.00	8.77	9.70	11.67	B	5.25	5.40	5.18	13.97	11.35	2.05	13.14	6.30	4.07	3.39	8.18	5.74	4.92	3.83	B	3.81	11.11	5.05
Sheet metal work	2.31	1.80	3.16	1.99	2.65	2.97	5.80	1.74	3.06	1.63	3.36	4.67	2.05	6.45	2.35	1.33	2.02	2.76	1.80	1.54	1.32	4.08	1.60	2.94	1.58
Steel erection—door and sash	2.68	2.13	3.67	2.32	3.40	3.44	4.70	2.44	3.21	1.81	4.60	2.58	4.05	6.81	3.05	1.68	2.28	2.81	1.75	1.74	1.46	A	2.00	3.58	1.54
Steel erection—interior ornament	2.68	2.13	3.67	2.32	3.40	3.44	4.70	2.44	3.21	1.81	4.60	4.32	2.10	6.81	3.05	1.68	2.28	2.81	1.75	1.74	1.46	4.06	2.00	3.58	1.54
Steel erection—structural	16.86	9.77	23.00	10.63	14.20	20.23	18.80	10.34	10.61	6.44	14.21	18.48	4.05	36.43	17.14	7.41	6.89	15.09	6.63	9.37	5.95	17.33	10.32	11.15	5.83
Steel erection—dwellings—2 stories	7.57	5.33	10.37	5.62	6.10	9.23	5.70	6.10	8.26	3.47	12.44	8.87	4.05	16.43	9.25	3.16	5.73	15.09	5.77	4.59	3.53	8.46	5.32	5.64	5.08
Steel erection—general	11.57	8.39	15.85	9.12	8.60	12.68	14.60	8.83	10.61	4.80	10.80	A	4.05	27.46	13.66	5.24	5.74	8.74	6.63	6.71	3.13	11.53	5.38	8.52	5.83
Tile work—interior	1.13	.99	1.55	1.09	1.60	1.62	3.40	.94	1.55	.80	2.50	1.53	.60	2.99	1.45	.77	1.05	1.26	1.92	.86	.67	1.44	.89	1.17	1.69
Timekeepers and watchmen	2.68	2.19	3.67	2.37	A	3.48	5.80	2.45	2.82	1.83	3.61	3.97	G	6.92	2.86	1.65	2.34	F	2.31	1.81	1.58	4.16	1.98	3.81	2.03
Waterproofing—brush	3.30	1.95	4.52	3.97	4.80	4.11	6.00	1.67	2.88	2.10	3.63	4.86	1.00	4.76	3.27	1.80	1.50	2.00	2.11	1.79	1.22	4.56	2.03	2.75	1.86
Waterproofing—trowel—interior	2.31	1.48	3.16	2.02	1.90	3.60	5.00	1.24	2.29	1.21	2.89	4.16	1.00	5.18	2.21	1.35	1.11	2.05	2.68	1.51	.82	3.59	1.35	2.06	2.36
Waterproofing—trowel—exterior	2.20	1.35	3.01	2.49	3.50	2.29	6.00	1.64	1.91	1.21	2.31	4.24	1.00	4.93	1.34	1.08	1.10	4.01	1.38	2.11	.82	3.98	1.15	1.90	1.21
Waterproofing—pressure gun	3.97	3.05	5.44	4.02	4.90	3.84	6.60	2.77	2.79	1.96	8.54	4.87	1.00	8.90	3.38	2.02	1.98	4.01	2.28	2.35	1.92	4.57	2.59	3.36	2.01
Wrecking	16.69	12.74	22.87	13.70	20.60	20.41	A	11.91	15.93	5.73	19.35	23.61	9.73	35.66	19.68	8.68	10.52	12.81	21.78	10.29	5.90	22.14	11.16	14.18	19.17

*A Specialty rated—refer to company. *B Rate varies with type of work. *C Includes form work. *D Pile driving, caisson and dam work separately rated. *E Special occupational disease loadings apply. *F Assigned to main classification. *G Subscription to State Fund mandatory—Nevada, Industrial Comm., Carson City, Nev.; Workmen's Compensation Bureau, Bismarck, N. Dak.; The Industrial Commission of Ohio, Columbus, Ohio; State Compensation Commission, Charleston, W. Va.; Workmen's Compensation Dept., State Treasurer's Office, Cheyenne, Wyo.

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Designed in accordance with specifications adopted by A. I. S. I. for light gauge structures, dated January, 1941.

DESCRIPTION

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WIDTH: 18 inches.

PANEL WEIGHT: 50 to 67 lbs., depending upon size of panel.

RIB DEPTHS: 1½", 1¾", 2", 2½", spaced 6" on centers.

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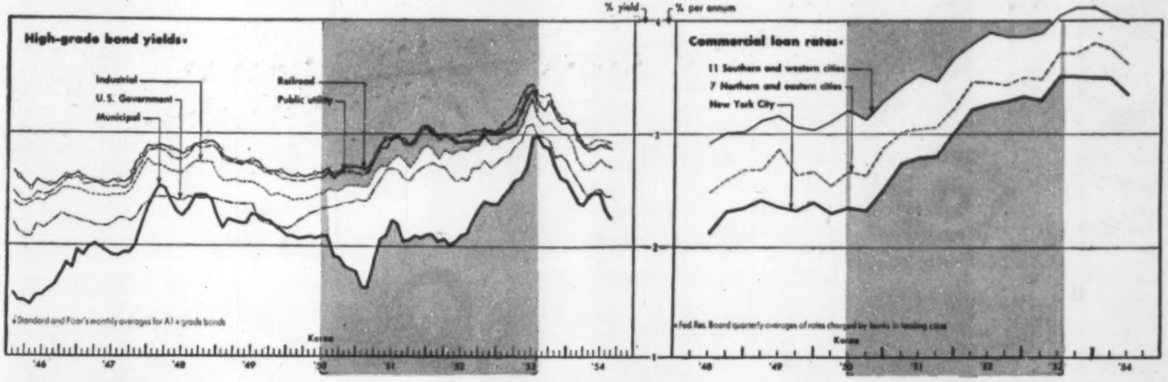

Interest rates favor construction boom

For the next few months at least, business firms planning to borrow long-term money for construction and contractors looking for bank loans will not have to worry about tightening interest rates. And there should be enough money available to finance a very high volume of construction.

Bond yields—per cent

Standard & Poor's

	Govt (1)	U. S. Treas (2)†	Municipal (3)	Industrial (4)	Pub Util (5)	Railroad (6)
1932	....	3.68	4.65	5.58	5.04	5.37
1933	....	3.31	4.71	4.98	4.69	4.54
1934	....	3.12	4.03	4.28	4.19	4.01
1935	....	2.79	3.40	3.73	3.59	3.58
1936	....	2.69	3.07	3.34	3.38	3.31
1937	....	2.74	3.10	3.16	3.22	3.46
1938	....	2.61	2.91	2.82	2.99	3.60
1939	....	2.41	2.76	2.64	2.83	3.39
1940	....	2.26	2.50	2.57	2.75	3.26
1941	....	2.05	2.10	2.50	2.69	3.16
1942	2.27	2.09	2.36	2.54	2.71	3.17
1943	2.29	1.98	2.06	2.55	2.64	3.10
1944	2.38	1.92	1.86	2.58	2.64	3.01
1945	2.34	1.66	1.67	2.50	2.59	2.75
1946	2.19	Disc.	1.64	2.44	2.50	2.59
1947	2.24	....	2.01	2.52	2.59	2.62
1948	2.43	....	2.40	2.70	2.83	2.89
1949	2.28	....	2.21	2.53	2.69	2.71
1950	2.32	....	1.98	2.48	2.63	2.66
1951	2.60	....	2.00	2.72	2.89	2.91
1952	2.68	....	2.19	2.87	3.01	2.98
1953	**2.90**	....	**2.72**	**2.70**	**2.92**	**2.87**
J	2.79	....	2.47	2.95	3.10	3.04
F	2.81	....	2.54	2.97	3.15	3.06
M	2.89	....	2.61	2.99	3.21	3.10
A	2.94	....	2.63	3.07	3.33	3.21
M	3.08	....	2.73	3.21	3.43	3.34
J	3.10	....	2.99	3.32	3.45	3.40
J	2.98	....	2.99	3.16	3.36	3.29
A	2.97	....	2.89	3.09	3.34	3.22
S	2.93	....	2.88	3.12	3.37	3.28
O	2.79	....	2.72	3.05	3.22	3.18
N	2.81	....	2.62	3.01	3.15	3.10
D	2.76	....	2.59	3.00	3.14	3.12
1954						
J	2.65	....	2.50	2.92	3.07	3.08
F	2.58	....	2.39	2.76	2.99	2.97
M	2.49	....	2.38	2.68	2.90	2.88
A	2.44	....	2.47	2.68	2.90	2.86
M	2.51	....	2.49	2.72	2.95	2.87
J	2.52	....	2.48	2.77	2.96	2.90
J	2.44	....	2.31	2.72	2.93	2.89
A	2.45	....	2.23	2.70	2.92	2.87

(1) aver. taxable long-term government bonds to replace the long-term Treasury bond series discontinued after December, 1945.
(2) aver. partially tax exempt long-term Treasury bonds, not due or callable for fifteen years. † Federal Reserve Bulletin.
(3) aver. 15 high-grade long-term municipals.
(4) aver. A1+ industrials.
(5) aver. A1+ public utilities.
(6) aver. A1+ railroads.

Let's look first at the capital market, where borrowers sell long-term bonds and mortgages to investors in order to finance construction and for other purposes.

• **Capital market**—For more than a year now, interest rates in this market have been drifting downward (left-hand chart, above). Two major forces are at work here: (1) the Federal Reserve Board's easy-money policy, and (2) cutbacks in long-term borrowing by business because of the general economic readjustment.

There is little chance that FRB will make any real change in its easy-money policy until another burst of inflation comes along. Just now there are few signs of inflation.

The Treasury itself can boost interest rates if it should decide to borrow substantial amounts of long-term funds, in competition with state and local governments, businessmen, and home buyers. But the Eisenhower Administration is going to be careful not to interfere with business recovery. If the Treasury does long-term borrowing within the next six months or so, it will take up excess long-term funds that lenders are unable or unwilling to place elsewhere.

A tremendous volume of revenue bond financing by state and local government agencies is scheduled for the next few months (ENR Sept. 16, p. 93). This volume may send interest rates on municipal bonds up a bit, and also may have some effect on corporate bond yields. Unlike general-obligation municipal bonds (those secured by the taxing power of the issuer), revenue bonds are competitive with corporates and sell at comparable rates.

• **Plenty of money**—However, there are plenty of funds available for investment in the new bonds and mortgages. Personal savings are piling up this year at an annual rate of about $20 billion. This is the highest savings volume since World War II, ahead of the same period in 1953 even though this is a year of recession, and the comparable 1953 months were a boom period. Lower income taxes and caution about spending have a lot to do with this.

Most of this money is going into savings accounts in savings banks and commercial banks, savings & loan shares, and life insurance premiums. These institutions, in turn, invest most of the money in bonds and mortgages.

• **Bank rates**—Average rates paid by business borrowers on short-term bank loans have been declining this year (right-hand chart, above). That goes along with the general decline in business activity since last fall.

Business concerns have been cutting their inventories, and hence need less bank financing to carry inventories. This fall, the usual seasonal rise in the volume of business loans has been very slow getting started. That has put pressure on banks—who compete fiercely with each other to get borrowing customers—to keep their rates down, or even shave them a little.

Banks have another competitor for short-term loans: the commercial-paper market, where investors who want to keep their money working for short periods buy the notes of high-grade companies.

In the past year or so, more and more companies who would ordinarily have borrowed from banks at 3% and up have been selling their notes in the commercial-paper market. Rates are much lower there; after a long series of reductions they now range between 1¼% and 1⅜%. Commercial-paper finds a ready demand from corporations with temporary excess cash who want to earn more interest than they can get from 91-day Treasury bills. Rates on Treasury bills have been below 1% most of the time this year.

So the chances are that bank rates won't rise much, if at all, during coming months.

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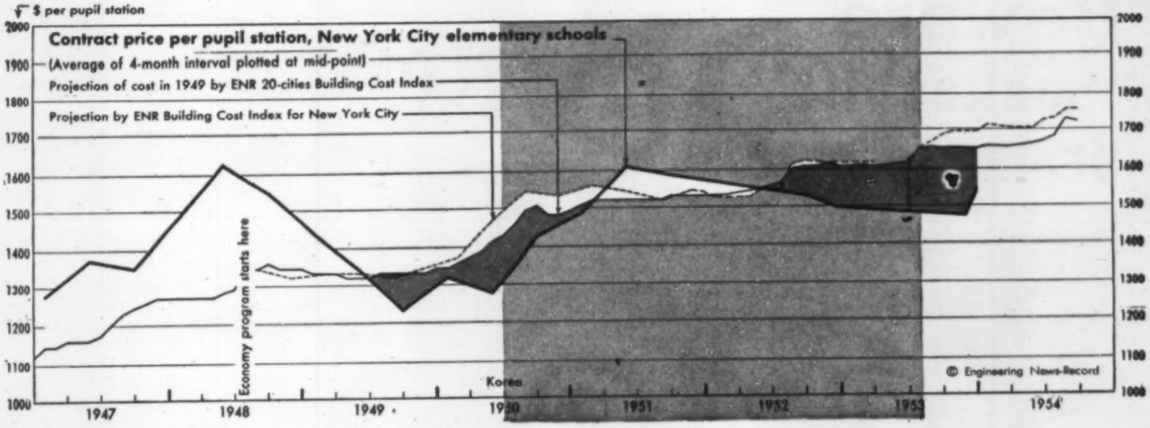
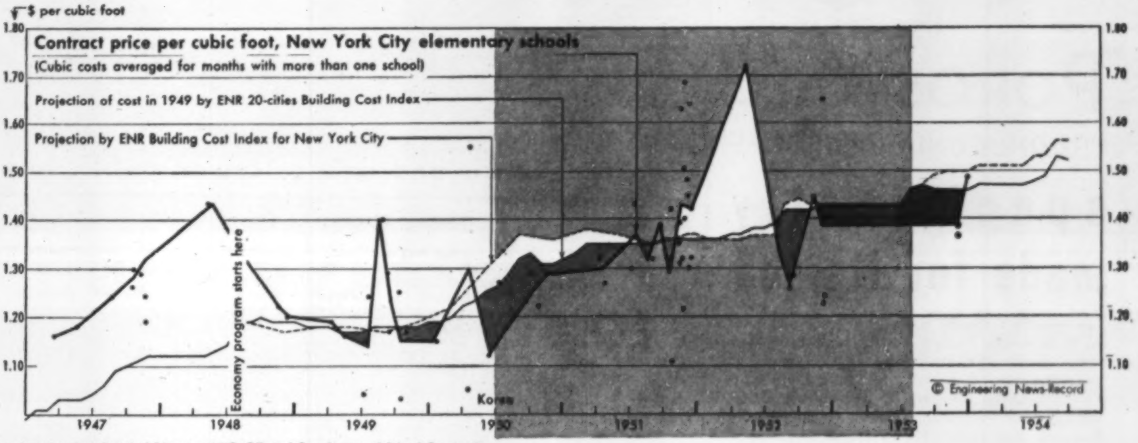




Based on data from Board of Education, NYC, Office of Coordination of School Construction

School building unit contract prices, New York City—1953

No.	Size, min-aver-max pupil station	Auditorium gymnasium	Min-aver-max COST per pupil station	Min-aver-max COST per cubic foot	Min-aver-max % of total bldg contract price* gen'l constr %	heating %	plumbing %	electrical %
Elementary schools, new 3-story								
1	914	aud & gym	$1548	$1.49	75.0	12.4	5.4	7.2
2	1137-1188-1238	aud & gym	1202-1345-1487	1.39-1.41-1.43	76.2-76.85-77.5	10.7-11.95-11.2	5.1-5.4-5.7	6.2-6.8-7.4
Elementary schools, new 2-story								
3	792 (all)	aud & gym	1553-1564-1570	1.37-1.38-1.39	75.1-75.3-75.6	11.0-11.1-11.3	5.7-6.0-6.2	7.5-7.6-7.8
Elementary schools, additions								
1	......	2-st; gym	....	1.55	76.2	11.6	5.2	7.0
[illegible]	......	2-st gym only	....	1.39-1.46-1.52	73.7-75.0-76.3	14.5-15.1-15.7	4.7-5.45-6.2	4.4-4.45-4.5
2	......	1-2-3-st; aud & gym	....	1.14-1.24-1.34	78.8-79.65-80.5	10.3-11.0-11.7	3.7-4.0-4.3	5.2-5.35-5.5
1	......	1-2-3-st; gym & kgtn	....	1.35	80.4	12.0	2.4	5.2
1	324	3rd st; clrms only	728	1.45	81.3	9.3	4.8	4.6
1	......	spec cereb palsy wing	....	1.80	76.6	8.3	6.2	8.9
Junior high schools, new 3-story								
5	1766-1954-2164	aud, gym, cafet	1176-1306-1460	1.18-1.23-1.29	74.1-75.1-76.0	10.7-11.4-12.4	4.7-5.1-5.4	8.1-8.4-8.7
Junior high schools, new 2 and 4-story								
2	1824-2005-2185	aud, gym, cafet	1182-1215-1248	1.10-1.20-1.29	75.5-75.9-76.3	9.2-9.7-11.1	4.8-4.95-4.9	8.5-9.1-9.7
High schools, new 3-story								
1	3019	aud, gym, cafet	1861	1.40	74.2	11.5	5.0	9.3

* Excludes abnormal foundation costs

Unit prices of schools built in New York City—by years

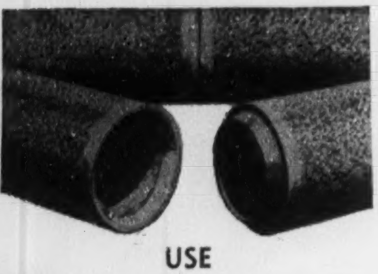
Elementary schools

		per cu ft			per pupil sta			capacity, pupil stas		
	no	min	aver	max	min	aver	max	min	aver	max
1947	(9)	$1.16	$1.25	$1.56	$1,255	$1,517	$1,991	558	1,162	1,550
1948	(5)	1.20	1.30	1.43	1,399	1,581	1,784	806	1,094	1,433
1949	(12)	1.03	1.18	1.40	1,148	1,334	1,638	868	1,181	1,588
1950	(11)	1.04	1.20	1.55	957	1,357	1,612	302	1,036	1,581
1951	(24)	1.11	1.39	1.69	1,447	1,710	2,451	358	885	1,274
1952	(9)	1.23	1.40	1.72	1,391	1,518	1,689	494	969	1,310
1953	(6)	1.37	1.41	1.49	1,202	1,488	1,570	792	944	1,238

Junior high schools

		per cu ft			per pupil sta			capacity, pupil stas		
	no	min	aver	max	min	aver	max	min	aver	max
1947	(2)	1.21	1.23	1.25	1,270	1,277	1,284	1,810	2,068	2,326
1948	(1)	1.32	1.32	1.32	1,623	1,623	1,623	1,518	1,518	1,518
1949	(3)	0.99	1.09	1.26	1,261	1,380	1,553	1,518	1,819	1,998
1950	(1)	1.07	1.07	1.07	1,210	1,210	1,210	2,012	2,012	2,012
1951	(5)	1.32	1.36	1.38	1,408	1,511	1,645	1,588	1,842	2,020
1952	(7)	1.10	1.22	1.31	1,187	1,342	1,451	1,732	1,813	2,056
1953	(7)	1.10	1.22	1.29	1,176	1,280	1,462	1,766	1,968	2,185

Beware
"makeshift"
drainage pipe



USE
POROSWALL
THE ONLY UNDERDRAIN PIPE
specifically
made for its job

You wouldn't specify an oil burner attachment for a new coal furnace. Solid pipe with open joints, slots, or perforations, when used for underdrainage, is a makeshift adaptation of a pipe originally designed for an entirely different purpose. Poroswall, however, is specifically designed and manufactured for underdrainage or leaching and nothing else.

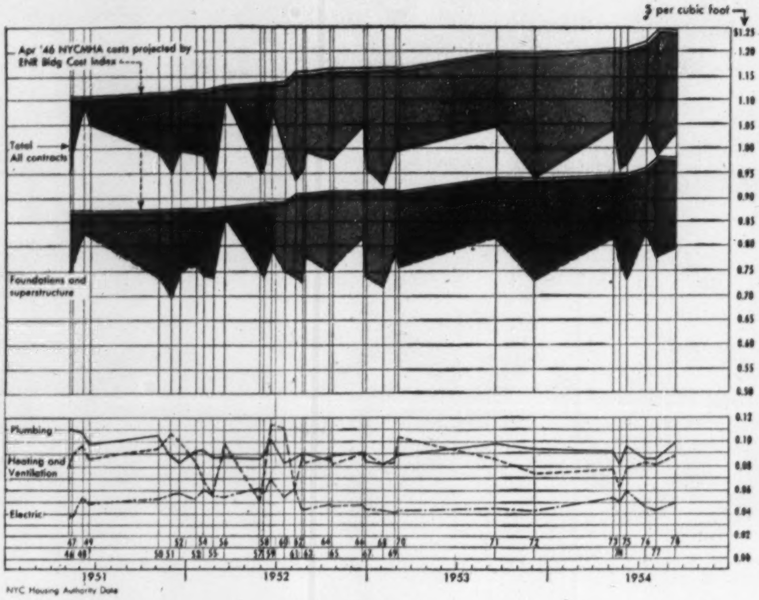
ADVANTAGES

- Poroswall drainage pipe is the fastest drainage medium known.
- Ideal underdrain for highways, airfields, and parking areas.
- Does not need a specially wrapped or bolted joint.
- Extremely porous over entire length and circumference—gives more filtration per square foot of surface.
- Strong, permanent, non-clogging, eliminates replacements.
- Poroswall used with foundations assures dry basements.
- Under floors Poroswall prevents break-up caused by excessive hydrostatic pressure.
- Extensively used for recharging diminishing water tables.

Among the many installations over the last 25 years are Idlewild, LaGuardia, and other airports, both civilian and military; N. J., N. Y. and Penn. State Highways; N. J. Turnpike and Garden State Parkway, U. N. Bldgs., N. Y. C.; Statler Hotels at Hartford, Conn. and Dallas, Tex.; Fort Dix, N. J.; Levittown, L. I.; Ford Motor Plants, Teterboro, Mahwah, and Metuchen, N. J.; Port of N. Y. Authority, Pennsylvania, N. Y. Central, D.L.&W. and other railroads; Dept. of Reclamation Dams.

Samples, additional information and other data on request or see Sweet's 1954 Architectural File.

Poroswall Pipe Division
Walker Cement Products Co.
Little Ferry, N. J.



Contract totals and unit prices on public housing

Awards by New York City Housing Authority

Project Number	2nd half 1953 (71)	 (72)	1st half 1954 (73)	 (74)	 (75)	3rd quarter 1954 (76)	 (77)	 (78)
Projec	**Brevoort II**	**La Guardia I**	**Howard**	**General Grant I**	**Baruch II**	**Bay view***	**Coney Is.***	**Sumner**
Total constr. rooms.....No.	2,009	1,542	3,298	4,744	3,345	6,509	2,175	2,362
Total apartments.......No.	484	370	816	1,127	798	1,610	534	585
Rooms per apartm't. Av. No.	4.15	4.17	4.05	4.21	4.19	4.04	4.07	4.04
Total cubage........Cu. ft.	3,987,730	3,057,063	6,943,700	6,350,000	6,350,000	14,262,296	4,912,800	4,822,564
Bid date................	9/15/53	12/1/53	5/11/54	5/25/54	6/8/54	7/13/54[a]	8/3/54	9/14/54
Cost per:								
Total contract............	$4,170,378	$2,879,375[c]	$7,215,435[b]	$9,292,087[c]	$6,153,288[c]	$14,885,471	$4,846,516	$5,044,272[c]
Constr. room............	2,175.84	1,867.30	2,187.82	1,958.70	1,839.55	2,286.91	2,228.28	2,135.59
Apartment..............	8,616.48	7,782.09	8,853.29	8,244.98	7,710.88	9,245.63	9,075.87	8,622.69
Cubic foot..............	1.045	0.941	1.039	0.959	0.969	1.043	0.986	1.033
Fndns. and superstruct.....	3,255,460	2,235,280	5,668,565	7,418,562	4,652,788	11,801,250	3,815,850	3,885,490
Constr. room............	1,620.44	1,449.60	1,718.79	1,563.78	1,390.97	1,813.07	1,754.41	1,645.00
Apartment..............	6,726.15	6,041.30	6,955.29	6,582.57	5,830.56	7,329.97	7,145.79	6,642.87
Cubic foot..............	0.086	0.731	0.816	0.765	0.733	0.827	0.777	0.796
Heating and ventilation.....	344,708	227,495[c]	543,000[b]	598,611[c]	498,700[c]	1,180,200	397,200	430,360[c]
Constr. room............	171.58	147.53	164.65	126.18	149.09	181.32	182.62	182.20
Apartment..............	712.20	614.85	666.26	531.15	624.94	733.04	743.82	735.66
Cubic foot..............	0.086	0.074	0.078	0.062	0.079	0.083	0.081	0.088
Electrical constr...........	176,000	132,060	374,900	483,788	384,600	671,688	211,000	245,094
Constr. room............	87.60	85.64	113.67	101.98	114.98	103.19	97.01	104.12
Apartment..............	363.63	356.92	460.00	429.27	481.95	417.20	395.13	420.40
Cubic foot..............	0.044	0.043	0.054	0.050	0.060	0.047	0.043	0.050
Plumbing.................	394,210	284,540	628,970	791,126	616,200	1,232,333	422,466	482,489
Constr. room............	196.22	184.53	190.71	166.76	184.51	189.33	194.24	204.27
Apartment..............	814.48	769.03	771.74	701.98	773.43	765.42	791.31	824.77
Cubic foot..............	0.099	0.093	0.091	0.082	0.097	0.086	0.086	0.099
Piling or abnorm. fndns.....	54,000	220,000	0	800,000	850,000	1,554,000	621,000	138,000

* Special standards—Part 4—city aided program; without cash subsidy *[a] fndn bids taken 2/9/54 *[b] incl total cost of boiler plant *[c] incl proportionate part of boiler plant cost

The range of bid prices on contracts for public housing projects in New York City continued to narrow during the first nine months of 1954, although prices tended to be a little higher than during 1953.

Competition among contractors has been largely responsible for this narrow range and has kept costs from reflecting the 4.1% increase September '53 to September '54 in prices of materials and wage rates paid by contractors in New York City—as measured by ENR's N. Y. Building Cost Index.

So far in '54, bid prices on contracts awarded by the New York City Municipal Housing Authority have ranged from a low of $0.959 per cu ft to a high of $1.043. This compares with a range of $0.927-$1.045 during 1953. Costs were higher than $1.00 per cu ft on three of the six housing projects let so far in '54, whereas only one cost more than $1.00 during 1953.

Higher electrical construction costs are the chief reason why '54 bid prices are a little over last year. Heating costs have climbed since 1953.

"Nothing equals ADAMS 660"

says WILCO BUILDERS

● The 140 hp. Adams "660" Motor Grader shown above is working on the Ohio Turnpike. It is owned by Wilco Builders, who say, "For ease of operation, power and output there is no comparison between the Adams "660" and any other grader we have owned. Its powerful engine enables us to get more work done with less effort."

Such owner satisfaction is making Adams *Improved* Motor Graders more and more popular with contractors and highway officials everywhere . . . for Adams Motor Graders give them more time-saving, work-producing advantages than any others on the market—*bar none!*

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- 8 Forward Speeds
- 3 Creeper Speeds (optional)
- 4 Reverse Speeds
- Dual Braking System
- Rubber-Mounted Engine
- Foot Accelerator

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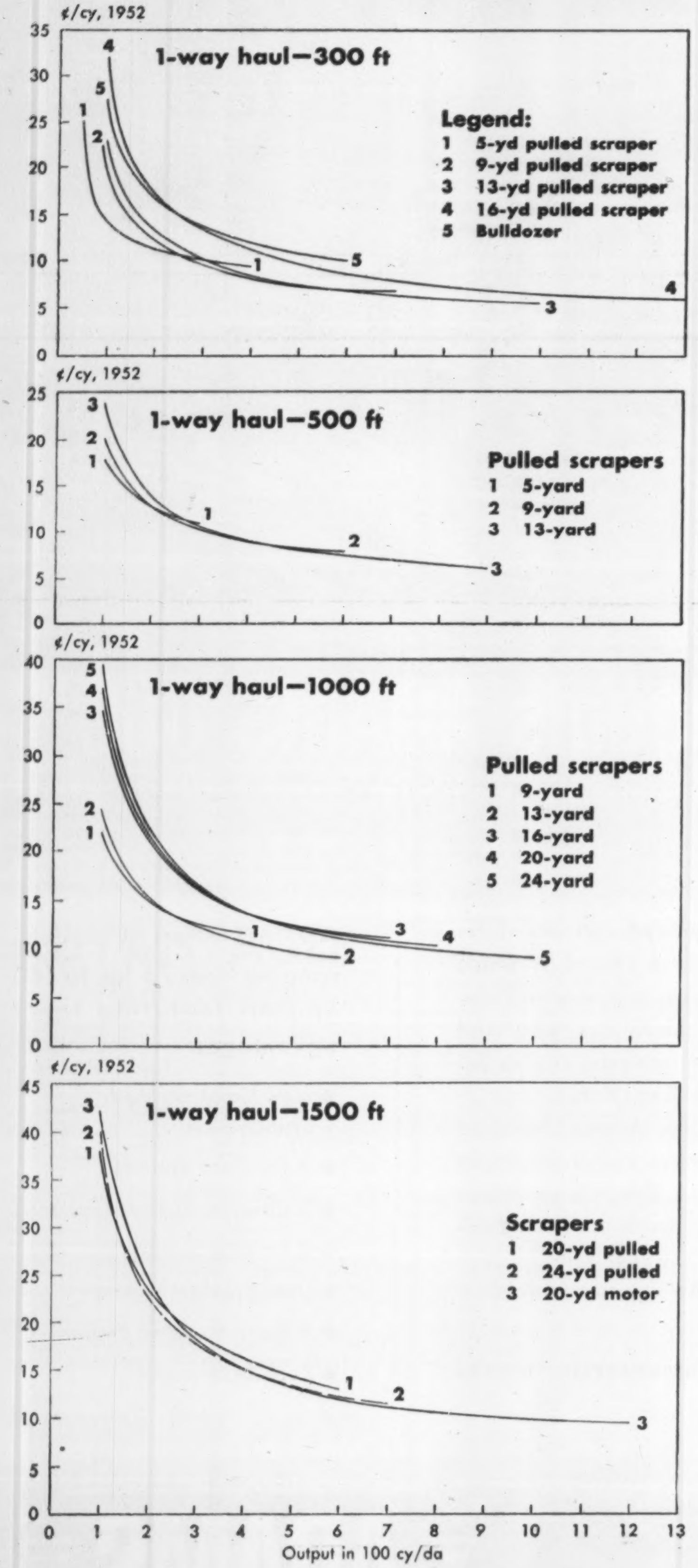


How machines affect prices

L. C. Jacox,
Industrial Engineer
Levittown, N. Y.

Construction equipment ownership represents such a big capital investment that a good working knowledge of equipment economics is a must in today's construction industry.

The study presented here is concerned fundamentally with the principles of equipment economics rather than with definite costs for definite conditions, of which there are an infinite variety. Nevertheless cost contour lines can be established and cost increments for selected conditions determined as guides for judging equipment performance on the actual job.

This study also brings out the high cost of doing nothing, either on the job or between jobs, by showing how much each machine costs per day before it moves a yard of material. High efficiency operation, 83% of the 60-minute hour, is used in computing these costs, a fact which should be especially noted, since Highway Research Board studies (in 1947-48)

Editor's Note: To apply the principles governing selection and management of industrial equipment to the infinitely more complicated problems of operating construction equipment, L. C. Jacox presented the material illustrated here to Columbia University on January 15, 1954 as a master of science report in industrial engineering.

Broadly speaking, it shows how unit prices can be used to guide management in selecting the most productive type and size of equipment, in judging equipment working ranges and efficiency and even in planning projects in size increments best suited for efficient equipment operation.

He has assembled and coordinated data supplied by equipment manufacturers, their distributors and associations, by contractors, government agencies, by the Civil Engineering Department, University of Colorado, by Engineering News-Record and by Construction Methods and Equipment. Chart forms and methods of analysis used stem back to such articulate men in the industry as D. K. Heiple of LeTourneau, E. O. Martinson of Koehring, Alan S. McClimon of Euclid, who authored the Construction Methods and Equipment series "Earthmoving—An Art and a Science" and to the Melman report credited in the text.

found construction equipment working only 39% of available time, power shovels 37%, 4-wheel scrapers 59%, and motor scrapers, 28%.

In total, this study applies the principles used in an economic analysis of industrial plant equipment to the infinitely more complicated problems of operating construction equipment. It was inspired by S. Melman's "The Relation of Production Design to Alternative Costs", a paper submitted to the American Society of Mechanical Engineers at its Production Section Annual Meeting, December, 1952.

How "alternative costs" can be developed for construction begins with the end product—the resulting unit prices per cubic yard—then continues in the five sections which follow:

I The effect on costs per cubic yard of size and type of machine, output and haul distance

II List prices, 1952 and price indexes

III Fixed and variable costs of owning and operating equipment

IV Capacity and output by size, speed and haul distance

V Effect of haul distance on output and cost.

I—UNIT COSTS: Total cost divided by total output produces the unit cost of earth moved by a machine. Getting this cost down to a profitable level constitutes the acid test of equipment management. How unit prices are affected by the type and size of machine, and by its cost and output is illustrated in the curves shown in the first series of diagrams.

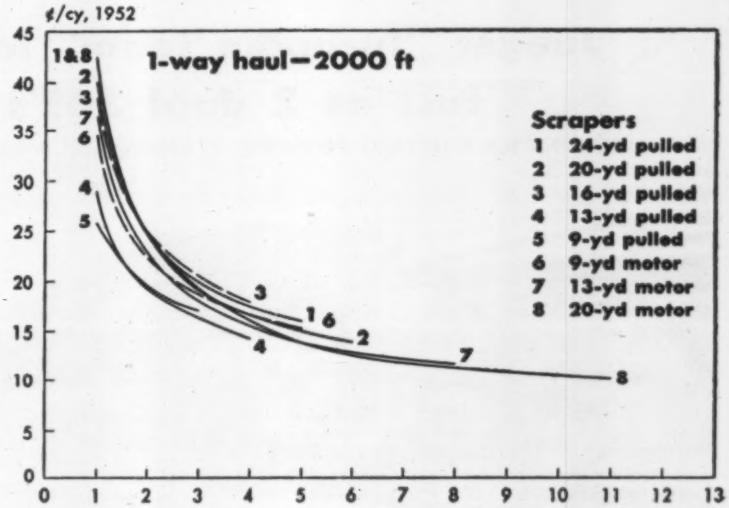
All of the machines considered in the study are working under the same set of assumed conditions. They are moving common earth, and they are loading and hauling on level ground and traveling on good surfaces. The developed charts correspond to these conditions, whereas an entirely different set of charts would result if tough or sticky clay or sand and gravel were being moved or if operations were carried out on up or down grades or even on level but poor surfaces.

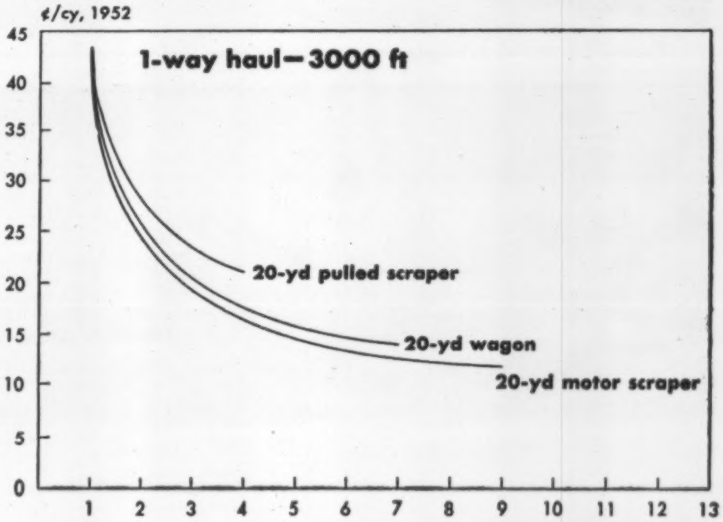
On the 300-ft haul, for example, note that for output under 225 cy/da (where the lines cross) the bulldozer produces lower unit costs than does the 16-yd pulled scraper but that above this output the big scraper wins.

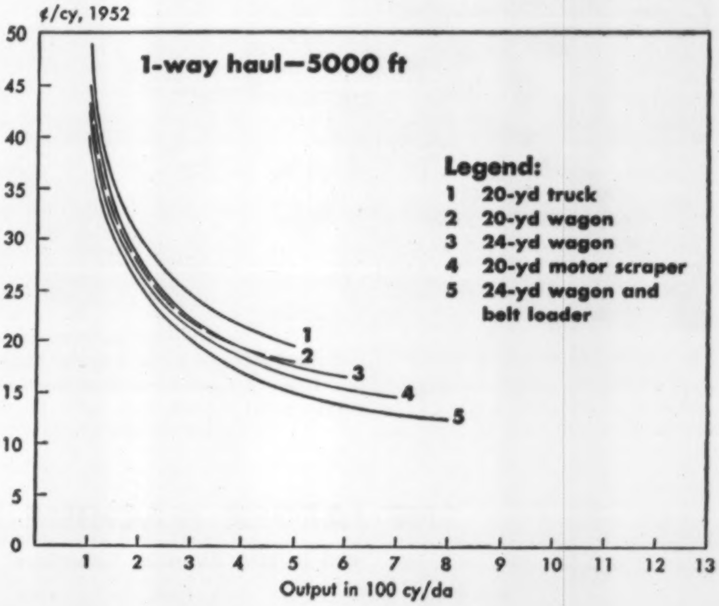
On the 1,500-ft haul, note that the 20-yd motor scraper switches advantage with the 20-yd pulled scraper at 250 cy/da and with the 24-yd pulled scraper at around 400 cy/da.

On the 5,000-ft haul the belt-loaded, 24-yd wagon produces the lowest unit cost on terrain where it is adaptable.

How these costs were derived is shown in the pages which follow:





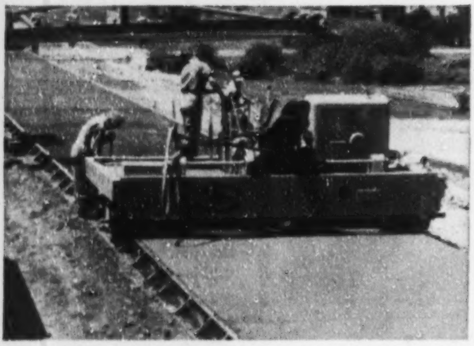


Jaeger "turnpike team" lays 12' slab as fast as 2 dual 34E's can pour

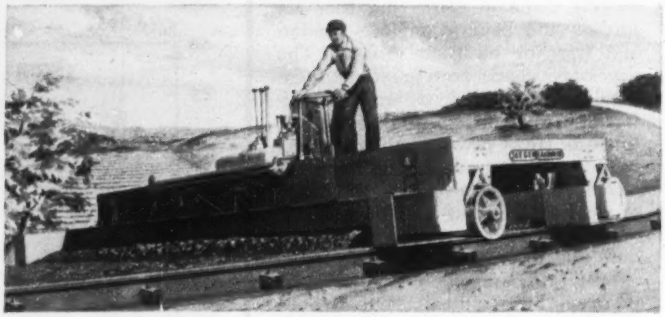
CONTINUOUS FORWARD PROGRESS . . . nothing back-tracks, even on super-elevated curves

Forward paver and Jaeger screw spreader pour and spread base course, on which reinforcing mesh is placed.

On top course, second paver is followed by Jaeger spreader *equipped with metering screed* and Jaeger finisher which is *equipped with diagonal rear screed whenever the job involves laying pitched slab or super-elevated curves.*



The oscillating metering screed of the spreader used on the top course makes precision strike-off just above form level, leaving an ideal surface for the finishing machine to work on.



Diagonal rear screed of finisher can be adjusted to any angle needed to work material to the higher side of pitched slab or super-elevated curves and compact solidly against the high form. Eliminates carry-back, cuts hand finishing to a minimum. For full details, see your Jaeger distributor or send for paving catalogs.

THE JAEGER MACHINE COMPANY

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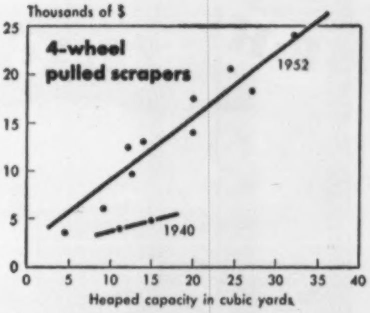
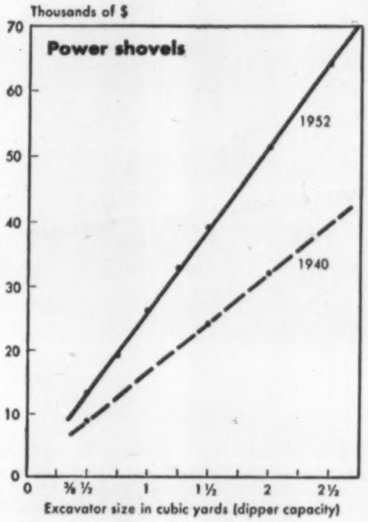
. . . Construction equipment prices and price trends

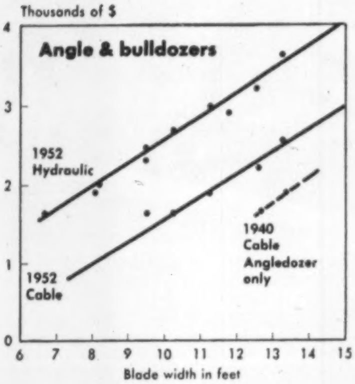
II–LIST PRICE: Purchase prices in 1952 are used in this report. These include tires but no extras and no delivery costs. What has happened to construction machinery prices since 1952 is shown in the price indexes that accompany the 1952 price diagrams.

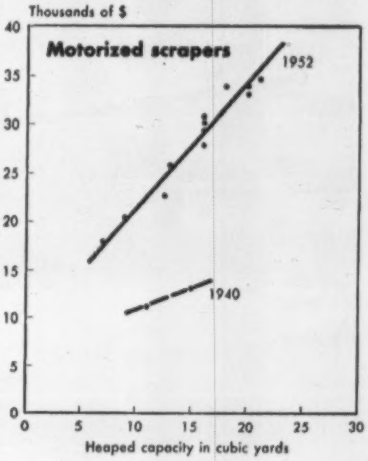
How prices vary with size is shown here as well as what the range of prices is for each of the types of equipment studied.

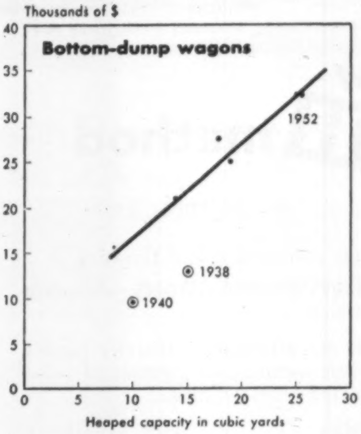
It is from this purchase price that the fixed expense is derived to determine owning and operating costs. This, along with variable operating cost is shown in the accompanying diagrams, definitions and qualifications.

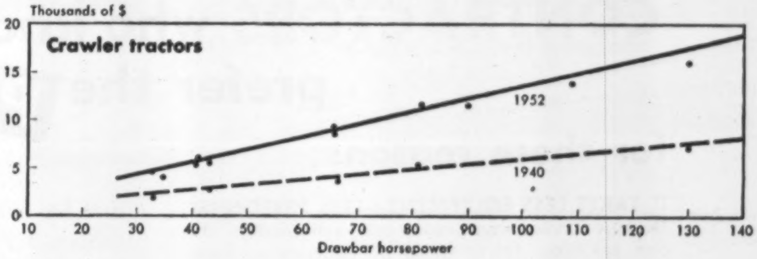


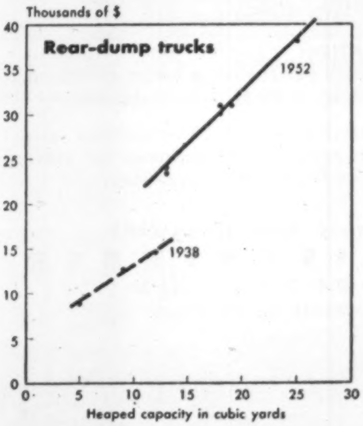












Construction machinery price index

Bureau of Labor Statistics, U. S. Department of Labor, 1947-49=100

By type of equipment	1947 Jan.	1948 Jan.	1949 Jan.	1950 Jan.	1951 Jan.	1952 Jan.	1953 Jan.	1954 Jan.	1954 Aug.
Construction machy & equip, all types	86.3	95.8	108.7	108.0	123.1	124.6	126.2	131.2	131.5
Power cranes, etc.	87.7	95.4	108.3	106.9	123.3	123.6	124.2	129.9	130.6
Machinery, tractor mounted	83.2	93.8	108.9	109.7	122.9	127.5	131.3	133.2	133.9
Specialized construction machinery	84.2	100.7	106.5	106.1	119.3	119.5	119.3	124.3	123.2
Portable air compressors	93.6	98.0	105.4	105.4	124.8	124.8	124.8	124.8	124.8
Scrapers and graders	85.9	95.9	110.0	108.4	127.3	128.6	129.6	129.4	129.4
Air tools, hand tools	89.6	97.5	106.0	106.8	120.5	120.5	120.5	125.0	125.0
Mixers, pavers, etc	89.3	95.6	107.7	105.9	117.9	118.5	117.7	122.9	121.6
Tractors, non-farm	84.1	95.0	110.1	110.3	123.9	126.6	131.1	139.5	140.6

All types by year and month

	1947	1948	1949	1950	1951	1952	1953	1954
Aver	**90.0**	**101.8**	**108.3**	**111.5**	**123.6**	**125.5**	.....	.....
Jan.	86.3	95.8	108.7	108.0	123.1	124.6	126.2	131.2
Feb.	86.9	95.4	108.7	108.0	123.6	125.2	126.2	131.5
Mar.	87.0	97.3	108.6	108.0	123.6	125.2	127.1	131.7
Apr.	87.5	97.5	108.5	108.0	123.6	124.9	128.6	131.6
May	88.5	97.6	108.3	108.2	123.6	125.5	129.1	131.5
June	89.5	99.5	108.3	108.1	123.6	125.4	129.4	131.5
July	90.3	101.4	108.3	108.8	123.7	125.4	130.8	.....
Aug.	90.9	104.1	108.1	112.6	123.7	125.3	130.5	.....
Sept.	91.4	106.7	108.1	114.6	123.7	125.8	130.9	.....
Oct.	92.3	108.0	108.1	115.6	123.6	125.8	131.0	.....
Nov.	93.7	108.6	108.0	116.2	123.8	126.2	131.1	.....
Dec.	94.7	108.7	108.1	121.7	124.0	126.3	131.1	.....

Construction equipment cost index, 1926=100

By Marshall & Stevens, Chicago

1913	63.0	**1924**	107.2	**1935**	79.7	**1946**	124.2
1914	59.2	**1925**	105.4	**1936**	83.0	**1947**	150.3
1915	61.2	**1926**	100.0	**1937**	87.2	**1948**	161.1
1916	67.5	**1927**	95.9	**1938**	82.9	**1949**	161.1
1917	88.2	**1928**	96.8	**1939**	82.4	**1950**	166.2
1918	122.6	**1929**	91.0	**1940**	83.4	**1951**	177.3
1919	129.0	**1930**	86.1	**1941**	92.0	**1952**	177.8
1920	154.4	**1931**	77.6	**1942**	100.8	**1953**	179.9
1921	119.7	**1932**	71.9	**1943**	101.3	**6/54**	183.4
1922	83.5	**1933**	71.8	**1944**	101.6	....	.....
1923	97.3	**1934**	76.0	**1945**	102.5	....	.....

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Asphalt stabilization in Ocean County, Michigan — Highway M-82

CONTRACTORS who know prefer the P&H method

for these reasons:

IT TAKES LESS EQUIPMENT—LESS PERSONNEL. Because several operations are combined in this *one* machine, fewer items of equipment, fewer men are needed to maintain a high rate of production.

LESS SUPERVISION. All operations are in progress at the same time — and usually visible from *one* point.

LESS WORK EXPOSED TO WEATHER. The only work exposed is that portion actually being processed. No preliminary preparation of soils, no large quantities of cement spread ahead in threatening weather.

LESS DELAY FOR WEATHER. This P&H Stabilizer can pulverize and mix soils at higher moisture content than can any other machine. Work can be resumed sooner following rain.

BETTER USE OF WORKING TIME. Operations can be conducted until late in the day and still leave time for complete compaction and finishing.

EASIER TO MEET SPECIFICATIONS. Accurate controls eliminate any guesswork.

LESS AERATION IN BITUMENS. Heavier grades of cut-back asphalt mean lower percent of volatiles to be eliminated from the mix.

EASY OPERATION. Operators with experience on heavy equipment usually learn to handle the P&H Stabilizer in less than one day.

FASTER OPERATION. Quicker job completion permits more work per season, a better return on your investment in a P&H Soil Stabilizer.

If you plan stabilized roads, base courses, airports of soil-cement, soil-bituminous or clay-gravel, contact us for latest information.

P&H SINGLE PASS STABILIZERS
HARNISCHFEGER
CORPORATION
MILWAUKEE 46, WISCONSIN

. . . Cost to own and operate earthmoving machines

III—OWNING AND OPERATING COSTS: These look simple on the curves, but they are subject to many theories and to little standardization. They have a major effect on unit costs.

In this study the manufacturer's recommendations are followed for each machine as to all costs except operator wages. Typical allowances include:

FIXED EXPENSE (usually based on purchase price + delivery − tires) Delivery is not included here.

Depreciation: Straightline method used, 5 years or 10,000 operating hours, except shovels and draglines where depreciating basis is:

	Shovels		Draglines	
Size, cy	**Yrs.**	**Hrs.**	**Yrs.**	**Hrs.**
⅜, ½, ¾....	5	10,000	5	10,000
1, 1¼, 1½....	6	12,000	9	18,000
2, 2½........	8	16,000	12	24,000

(New law permits choice of straight-line, declining balance or sum-of-the-digits methods of depreciation which affect equipment ownership costs materially—see ENR 7-29-54, pp. 91-94.) **Interest** 6%, **insurance** 2%, **taxes** 2%, or 10% of average investment based on depreciation period.

$$I = \frac{N+1}{2N} \times \text{delivered price}$$

(usual practice) where I is average investment and N, the number of years in depreciation period (delivery costs not included in this study).

Maintenance and repairs: Theoretically this should be split between fixed and variable expense. Manufacturers' data examined, however, showed it to be considered fixed by some and variable by others. Various methods of computing this item of expense include:

- a. % of purchase price ÷ hours worked
- b. % of purchase price ÷ depreciation hours
- c. repairs and labor estimated at 100% of delivery price—entire depreciation period in hours This divides 45% for labor. 55% for repairs for diesel crawler tractors.
- d. allowing 90% of the first hourly cost on smaller units, and tapering down to 70% on the larger units.

Overhead and supervision: This cost should be considered but is not included in this study.

VARIABLE EXPENSE

Fuel: averages used

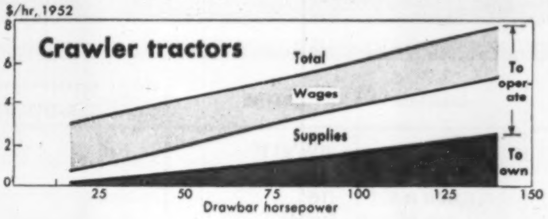
		1952	1940
Diesel	=	$0.14/gal	$0.08/gal
Gasoline	=	0.20	0.15

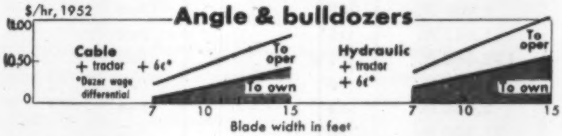
Lubricating

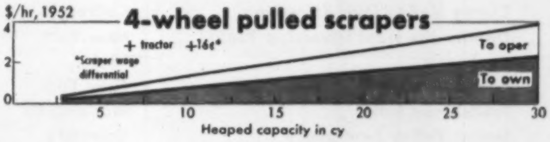
		1952	1940
oil	=	$0.75/gal	$0.65/gal
grease	=	0.15/lb	0.12/lb

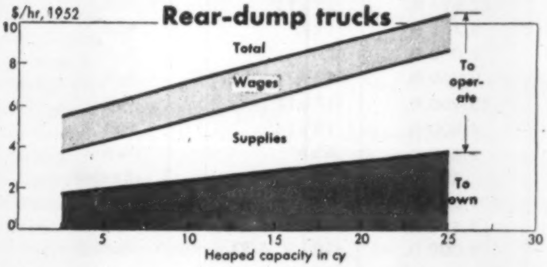
Maintenance and repairs—Although theoretically an item of both fixed and variable nature, manufacturers' data does not split maintenance and repair expense. For this study, manufacturers' data is used and this expense is considered solely as a variable cost.

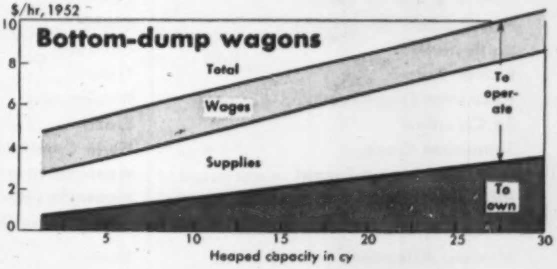
Tires: One method of computation is: Replacement costs ÷ mileage × average speed/hr. (For example, a 17-yd wagon averaging 45,000 mi/yr needs tire replacements costing $9,830 or

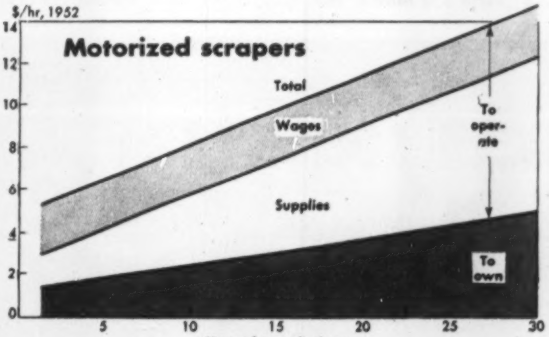


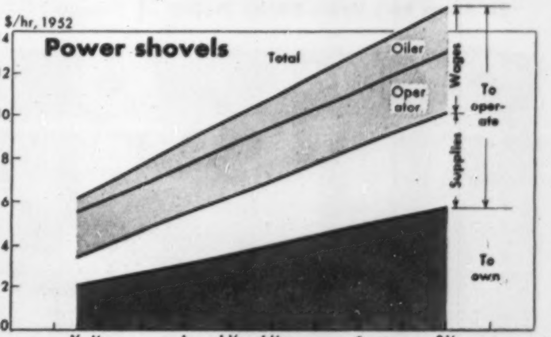




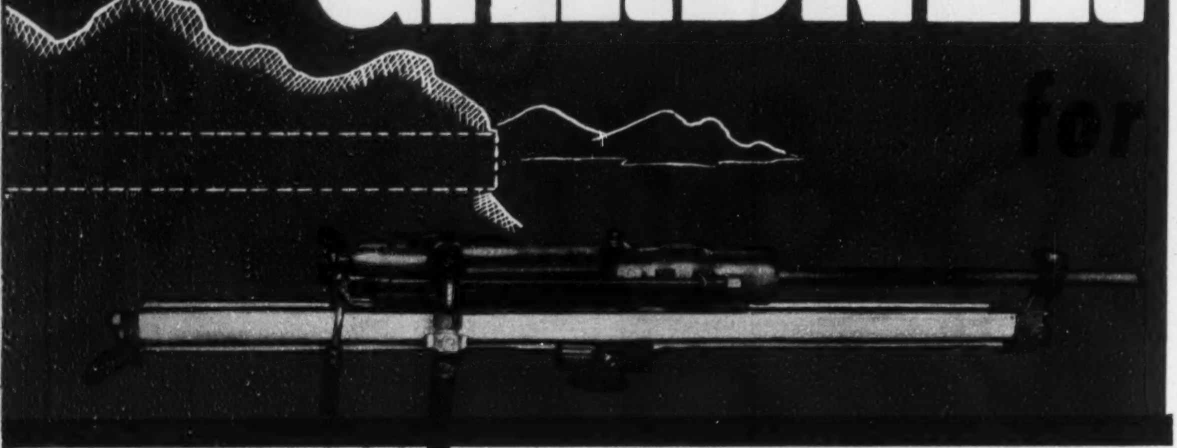








604,057 feet prove... it's GARDNER for



TUNNEL	LOCATION	LENGTH	BORE	DRILL EQUIPMENT GARDNER-DENVER
Bear River, Mokelumne Project	California	13,520 ft.	8½'x11'	Full
Bingham Tunnel #5840	Utah	7,000 ft.	21'x26'	Full
Carter Lake Pressure	Colorado	5,800 ft.	10'	Full
Cherry Valley Dam Diversion	California	1,280 ft.	18½'	Full
Downsville Dam Diversion Tunnel	New York	1,900 ft.	45'	Full
Duchesne	Utah	31,665 ft.	11'	Full
East Delaware Aqueduct	New York	132,860 ft.	11'4"	Full
Frenchman Hills	Washington	9,200 ft.	16'	Full
Grand Valley Emergency	Colorado	2,240 ft.	13'	Full
P. G. & E. Pitt #4 Tunnel	California	21,500 ft.	23'	Full
Paraiba-Pirai Diversion	Brazil	12,624 ft.	25'x23'	Full
Rattlesnake	Colorado	8,760 ft.	11½'	Full
Rideau River	Ontario	9,000 ft.	7'	Full
Ross Dam Diversion	Washington	2,000 ft.	19½' and 27½'	Full
Sa Carvalho	Brazil	13,400 ft.	17'x17'	Full
Tennessee Creek	North Carolina	4,800 ft.	13'x14'	Full
U of Washington Tunnel	Washington	5,280 ft.	6'x8'	Full
MDC North Relief Sewage	Massachusetts	3¾ miles	12'	Partial
Piney Branch Trunk Sewer	Washington, D. C.	1,875 ft.	15'	Full
Meilleur Atlantique	Quebec	1,575 ft. 9,000 ft.	11' 10', 9' & 7'	Full Partial
Sir Adam Beck Hydro-Electric Project	Ontario	Twin 5½ mile	52'	Partial

SINCE 1859

GARDNER-DENVER

-DENVER

tunnel drilling!

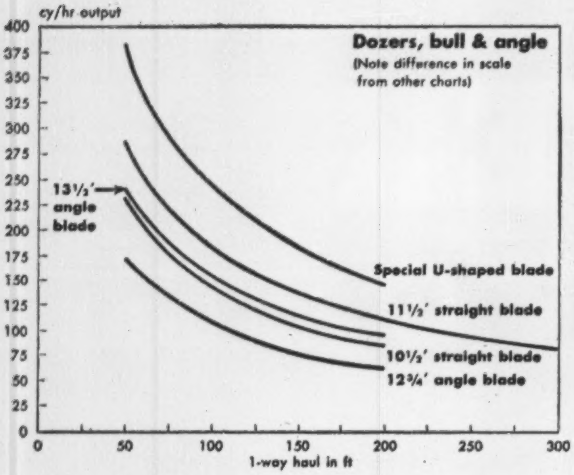
Here's the tunnel record . . . that speaks for itself . . .

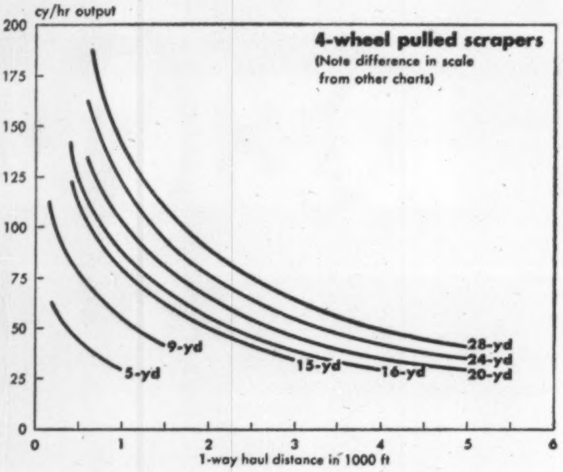
It adds up to 604,057 feet of tunnel — and remember, this list represents ONLY those tunnels which were drilled during the last five years!

TUNNEL	LOCATION	LENGTH	BORE	DRILL EQUIPMENT GARDNER-DENVER
Hamilton Sewer Project	Ontario	3,300 ft. 2,780 ft.	12½'x12½' 8'x8½'	Full Partial
Cincinnati Water Works	Ohio	14,000 ft.	11'	Full
Santa Cecilia-Vigario	Brazil	12,624 ft.	25'x23'	Partial
Calumet Contract #18C	Illinois	2,000 ft.	7'1"x6'4¼"	Partial
P.G. & E. Hendricks Tunnel	California	4,600 ft.	6'x7½'	Partial
South Laguna Beach Sanitary Sewer	California	12,000 ft.	4'x6'	Full
Spokane Sewer Tunnel (Section B-2)	Washington	6,250 ft.	6½'x7½'	Full
Cobbs Creek Intercepting Sewer	Pennsylvania	6,000 ft.	10'6"	Partial
Metlakatla Indian Community Purple Lake Project	Alaska	2,600 ft.	7'x7'	Full
Boqueron Tunnel #1	Venezuela	5,900 ft.	28.7'x19.7'	Full
Boqueron Tunnel #2	Venezuela	1,560 ft.	28.7'x19.7'	Full
Belviso Creek Project	Italy	16,150 ft.	10'2"	Full
Surco Tunnel Project	Peru	20 km (12.5 miles)	9¼'x8¼'	Partial
Southwest Main Gravity Intercepting Sewer Tunnel	Pennsylvania	18,000 ft.	17' to 8'6"	Full
Bacon Tunnel	Washington	10,000 ft.	21' horse shoe	Full
Detroit Dam Diversion Tunnel	Oregon	230 ft.	31' horse shoe	Full
Detroit Dam	Oregon	1,200 ft.	28'	Full
Lucky Peak Dam	Idaho	1,200 ft.	23'	Full
Eugeria Hidroelectrica Andina S.A.	Peru	7.8 miles	9'x12'	Partial
Laranjeiras	Brazil	3,320 ft.	20'x60'	Full

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS
FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada) Ltd., 14 Curity Avenue, Toronto 16, Ontario





$0.218/mi. At an average speed of 12 mph tire cost per hr is $2.62).

Operators Wages:

Machine	Cities averaged	Aver. rate per hour* 1952	1940
dump truck	30	$1.79	$0.85
motor wagon	14	2.04	0.96
tractor	20	2.21	1.15
bulldozer	37	2.27	1.18
scraper	35	2.37	1.23
shovel	45	2.65	1.38

* BLS minimum rates

These do not include fringe or welfare benefits, nor is any allowance made for compensation insurance based on payroll.

No allowance is made for differentials in force in some areas for operating larger capacity equipment.

Variation in wage rates on different equipment units in different localities can be great enough to switch the economic operating advantages of the machines.

Supervision and overhead: Not included in this analysis of operating costs.

Other variables not included (except in 83% efficiency rating in figuring output):

Careless operation resulting in higher maintenance and repair costs.

Maintenance effectiveness in reducing emergency repairs.

Variation in prices and wage rates by localities.

. . . How output is calculated, with assumptions made

IV—OUTPUT: The volume and consistency of output has a stronger effect on unit costs than either the fixed or variable expenses.

Output depends on working conditions, which have to be assumed for this study.

The first assumption is that every machine in the study is working under the same general conditions, which are these:

1—work is in "good common earth"

2—rolling resistance is 40 #/ton, for good, hard haul surface

3—grade is level

4—operating "efficiency" is a 50-min hour, or 83%

5—swell factor, is 80%, weight 2100-3100 #/cy

6—rim or track-pull, equipment is in good average condition working at sea-level

7—an 8-hr day prevails

8—conditions are average rather than "tough" or "excellent"

9—power is balanced to capacity and engines are operating at optimum power (under-powered equipment reduces output)

10—number of hauling units is in optimum ratio to loading unit for length of haul

11—full loads are assumed (under-loaded units would reduce output)

12—these speeds are used:

	mph range	used*
crawler tractor	7	......
bull- or angledozer, loaded	1.5	2.2–2.3
return	up to 7	3.8–6.9
scrapers, pulled	5–7	5–7
scrapers, motor	up to 35	10–30¹
off-highway dump-trucks, loaded	25–30	10–30¹
bottom-dump wagons, loaded	20–30	10–30¹
empty	30–35	
belt excavator-loader	20	5–7²

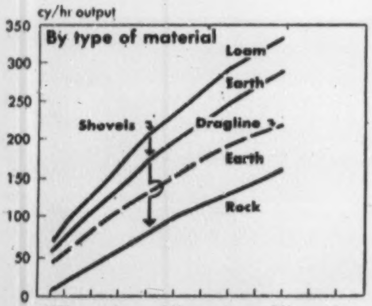
* for computing curves shown in this study

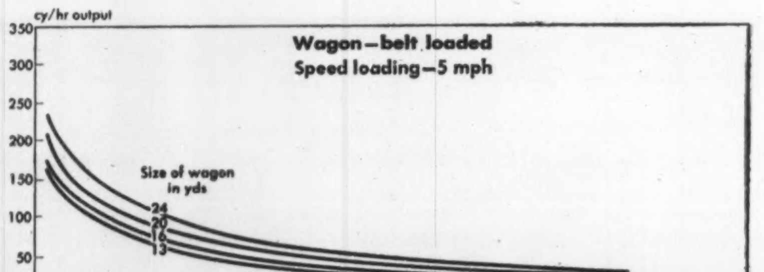
[1] computations assume average loaded and empty speeds are the same

[2] as used with bottom-dump wagons operating at average loaded and empty speed of 20 mph

13—Theoretical output formula

Earthmoving equipment output, in cubic yards per hour is a product of the capacity of the machine, the swell factor of the material to be moved, the haul distance, the operating efficiency (in minutes of productive time per hour) and speed of the equipment.





Output formula

This formula, used by the Corps of Engineers, U. S. Army is adopted for this report:

$$P = \frac{60\,C f E}{t_f + t_v}$$

P = bank production (pay-yds) in cy/hr
C = heaped capacity of unit (loose cy on 1:1 slope above struck capacity)
f = swell factor in %
E = efficiency (83% for a 50-min working hour)
$t_f + t_v$ = cycle time of unit
t_f = fixed time in minutes (loading, dumping, turning, swinging, spotting, shifting)
t_v = variable time in minutes (travel loaded + travel time empty)

In all cases other than for dozers and pulled scrapers, it has been assumed that haul and return speeds are the same. Under these conditions,

$$t_v = \frac{\text{total haul distance in feet}}{(\text{speed in mph}) \times 88}$$

This formula has been used in computing all curves other than dozer and pulled scraper output. Manufacturer's data is used for these.

14—loading cycles are:

Scraper and wagons, average fixed loading time, t_f

	Tractor	
	track	wheel (pusher-loaded)
Scrapers,		
15 cy & under	2.5 min.	3.0 min.
over 15 cy	3.0 min.	3.5 min.
Wagons		
15 cy & under	1.5 min. + t_l	2.0 min. + t_l
over 15 cy	2.0 min. + t_l	2.5 min. + t_l

t_l = excavator loading time

Shovels loading haul units (90° swing assumed; optimum depth of cut, 7.8 ft; grade and level loading)

Size in cy capacity			Time in minutes		
Shovel	Haul[1] unit	Haul[2] unit	Loading (seconds)	Cycle	Loading Total[2]
⅜	1½-2	1½-2	23	.38	1.5-1.9
½	2-2½	2-2½	23	.38	1.5-1.9
¾	3-4	3-4	24	.40	1.6-2.0
1	4-5	4-5	25	.42	1.7-2.1
1¼	5-7	5-7	25	.42	1.7-2.1
1½	6-8	6-8	28	.47	1.9-2.3
1¾	7-9	7-9	29	.48	1.9-2.4
2	8-10	8-10	30	.50	2.0-2.5
2½	10-12	10-12.5	31	.52	2.1-2.6
2½		16[2]	31	.52	3.3
2½		20[2]	31	.52	4.2
2½		24[2]	31	.52	5

[1] Based on recommended hauling unit size of 4 to 5 times shovel dipper capacity

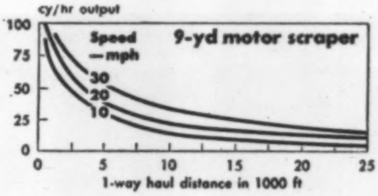
[2] Haul unit size used in this report. Use of a larger shovel to reduce loading time would improve performance of larger units.

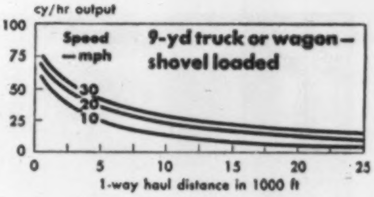
Truck and wagon spot, turn, shift and dump time is estimated to be 1.5-2.5 min; this time, together with the loading time shown above, make up the haul unit fixed time t_f

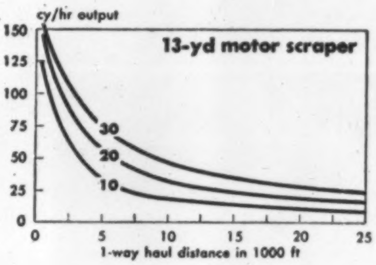
Belt loaded (54-in. belt, peak efficiency assumed)

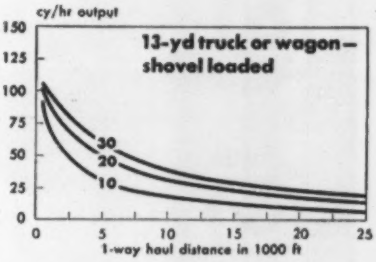
Wagons, heaped capacity, 20 mph haul and return speed

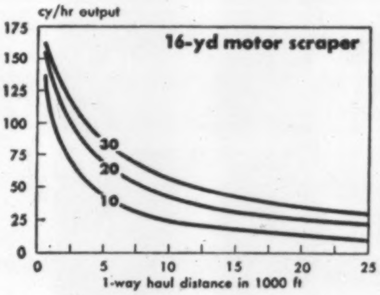
Loading time 13 cy 30 sec 20 cy 50 sec
16 cy 40 sec 24 cy 60 sec

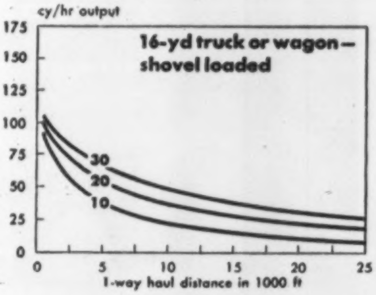


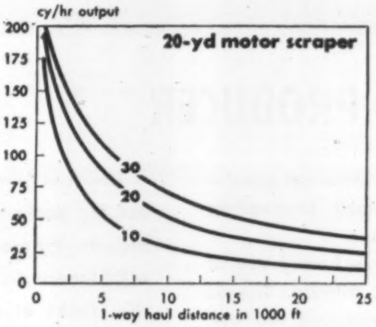


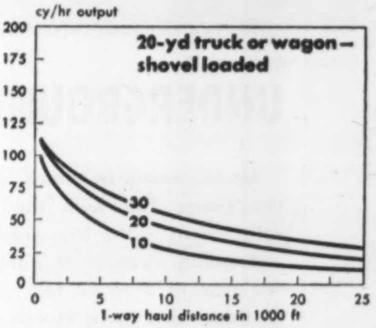


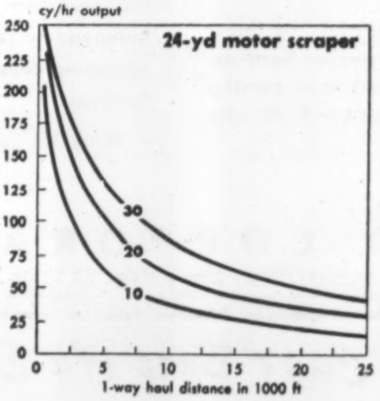


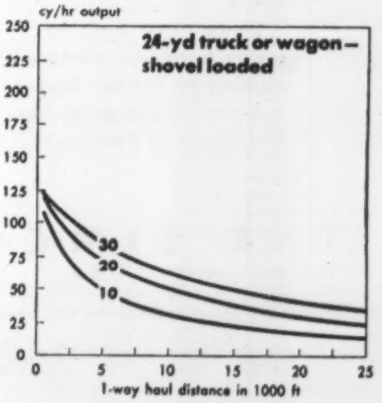












UNDERGROUND PRODUCER

Underground in mines, construction jobs — the Eimco 105 with the Eimco excavating attachment is the big producer.

Loading trucks with abrasive heavy ore at the rate of 8 to 10 tons per minute, Eimcos in this mine, have steadily reduced the cost of loading ore every month since their installation.

Eimcos are built to withstand the most severe treatment working on uneven bottoms, digging in blocky, broken rock and moving in narrow passages or big rooms with definite limitations in headroom.

Unusual Eimco features make them a standout for performance. Some of these features include frame mounting of the excavating attachment to provide for free oscillation of the tracks at all times, variations in Rocker-Arms and buckets to meet all requirements for headroom and material to be loaded. Independent track control with finger tip operating levers and many other exclusive features.

Write for complete information.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

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EIMCO

B-77

You Can't Beat An Eimco!

15–Payloads (bank or in-place measure, or heaped capacity × swell factor) in relation to body size (loose, struck measure)

Off highway rear-dump trucks Payload tons	Off highway rear-dump trucks Body size struck cy	Bottom dump wagons 2- or 4-wheel trac drn Payload tons	Bottom dump wagons 2- or 4-wheel trac drn Body size struck cy
10	6.6	15	8.9
15	9.7	20	13
22	14.8	22	14
30	21	26	17
34	21	28½	18
50	33	39	25

16–Haul distances used are "apparent" or "observed"–from end of loading run to beginning of dumping. Theoretical "true" distance from center of loading to center of dumping was not used.

Not allowed for are:

a. effects of environment and climate in days lost
b. tractive efficiency (ranges from 100% on dry, rough, concrete to 10% on ice)

. . . Cost per day

V–COST OF OUTPUT: Converting the fixed and variable costs shown in section III to cost per day for each machine and plotting them against the corresponding output gives the working range of each machine as shown in the charts below. Each diagram represents a different haul distance and its effect on the output-cost ratio.

Note the horizontal line for each equipment unit which is its fixed cost even if the machine it represents doesn't move a scoop of earth.

Then, by plotting the total theoretical output for the day against the total cost per day, the slant of the resulting trapezoid gives the cost per day for whatever output is produced up to the capacity of the machine.

From these totals come the cost-per-cubic yard shown in Section I.

These charts show, more dramatically than any other, the high cost of idle equipment and also how larger output or production absorbs the fixed "overhead" costs.

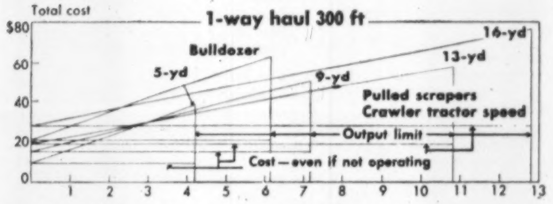
• Conclusions

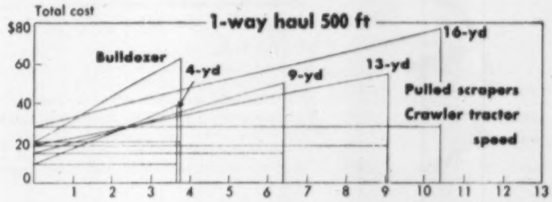
Earthmoving costs are a far cry from the pick and shovel, hand-labor days when output of 2 cy/hr could be expected, digging to a 3-ft depth. A 2-yd power shovel excavates 330 cy/hr in sand to an optimum digging depth of 7-8 ft.

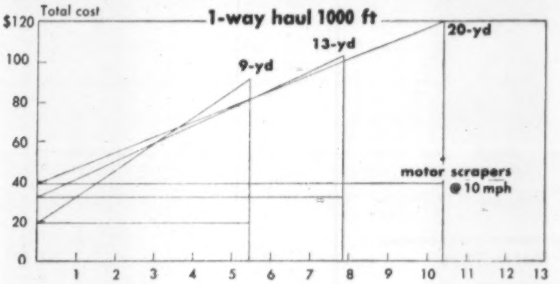
What this does to unit prices is this:

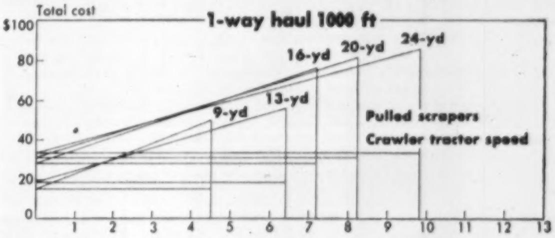
	Cost per cu yd 1941	Cost per cu yd 1952
Manual excavation	43.5¢	95.0¢
Power shovel	2.8¢	3.9¢

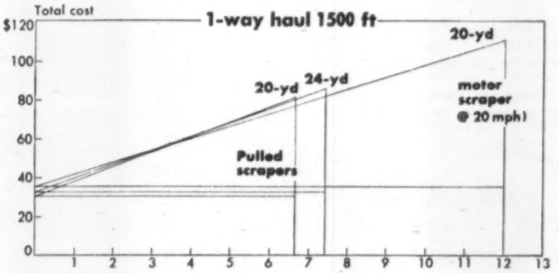
But this isn't the end of the line. There is still a lot to learn in refining earthmoving costs, the product of output vs. expense.

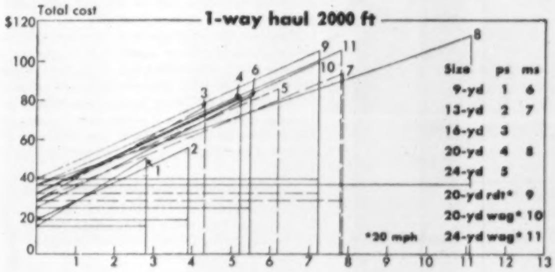


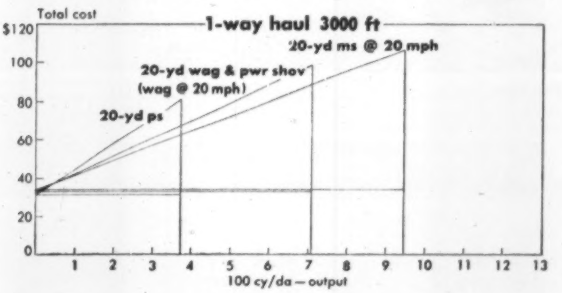


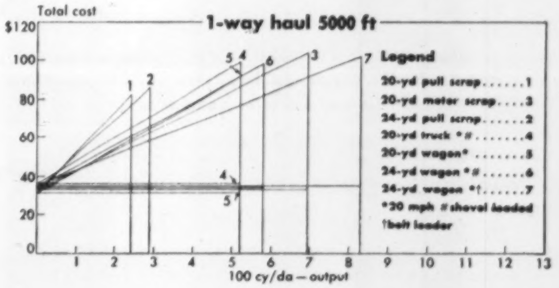












Leach CORPORATION
PRESENTS

"The Ultimate in Controls"

Through modern research, engineering, development, design and production techniques, *Leach* CORPORATION presents electrical control units you will want to investigate . . . *immediately!* Take advantage of the savings they provide and, the *unsurpassed* performance characteristics they incorporate.

INET RX60 Voltage Regulator

Using a completely static system, the RX60 has been designed to provide precise Voltage Regulation for all 60 cycle equipment.

Available in range from 1 KVA to upwards of 5000 KVA, the RX60 can be regulated to ±½%. It is adaptable to any machine with an exciter or will provide its own excitation if necessary.

Having no tubes, contacts or other electronic devices, the RX60 will last indefinitely with a minimum of maintenance.

INET RX400 Voltage Regulator

The RX400 also incorporates all static components and is made to give the same features of long life and low maintenance for 400 cycle applications.

Adaptable to all 400 cycle alternators, the RX400 will regulate voltage to ±½%, no load to full load.

This unit is recommended for use where precise regulation is important, such as Ground Power Supplies, Testing Aircraft Instruments, and in Guided Missile applications.

INET DUPY Electro-Mechanical Governor

The DUPY is a load-sensing, electro-mechanical governor used for controlling the speed of a gas or diesel engine. In controlling this speed the DUPY holds D. C. Voltage stable and A. C. Frequency constant under *all load conditions.*

Extremely simple in design, the DUPY can be fitted to any make or model gas or diesel engine by the use of a simple adapter mounting.

Through the use of the DUPY governor, time between engine overhauls can be increased by several hundred percent.

PALMER Series 60 and 400 Alternators

A completely new line of 60 and 400 cycle alternators designed to give exacting frequency output.

Meeting all military and civilian requirements of perfect sinewave, low harmonic content and precise output, PALMER "Series 60 and 400" alternators are ideal for aircraft, guided missile industries and industrial commercial application.

The "Series 60" may be coupled to any prime mover—gas, diesel, natural gas, etc. The "Series 400" is available as a 2-bearing M-G Set or may be purchased for use with any of the above type engines in 2 or 4 bearing units.

For the "Ultimate in Control" use a *Leach* CORPORATION "Precise Power Package". . . PALMER 60 or 400 cycle alternators, INET RX Voltage Regulators—DUPY Governors. These units are designed to provide exacting regulation and performance.

Write for Bulletins describing these products in detail.

***Leach* CORPORATION has outfitted a demonstration truck with all of the above operating equipment. Private and public showings are scheduled throughout the country. Write for date the truck will be in *your* vicinity.**

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SPECIALISTS IN ELECTRIC & ELECTRO-MECHANICAL CONTROLS

Incinerator, Ohio to cost $1,850 per ton of capacity

Hamilton County Ohio took alternate bids on glazed brick vs concrete block interior walls for the building to house its new 150-ton, $277,000 incinerator. On bids opened August 4, 1954, Ferro Concrete Construction Co. was low at $149,445 for the block alternate, $152,645 for the brick. These flank the engineers' estimate of $150,000. George Lemmel is county engineer, Alfred LeFeber & Associates are the consultants.

Bids May 11 on mechanical equipment and chimney brought contract prices of $102,500 and $22,985 from Pittsburgh-Des Moines Co. and American Chimney Co. respectively. The engineers' estimate was $127,000, just over 1 percent above the price.

Bidders on the equipment and chimney include:

1C	Pittsburgh-Des Moines Steel Co., Pittsburgh	$102,500
2	Nichols Engr. & Research Corp, New York	110,333
2A*	Morse Boulger Destructor Co., New York	105,876
6	American Incinerator Corp, Detroit	118,134

Bids 5-11-54		Price
150-ton incinerator	1C	2 & 2A
Hand-stoked with preheater	$89,000	no bid
without preheater	82,400	no bid
Mech-stoked with preheater	109,100	$115,973
A*	no bid	110,480*
Mech-stoked without preheater	102,500	110,333
A*	no bid	105,876*

* circular furnace alternate

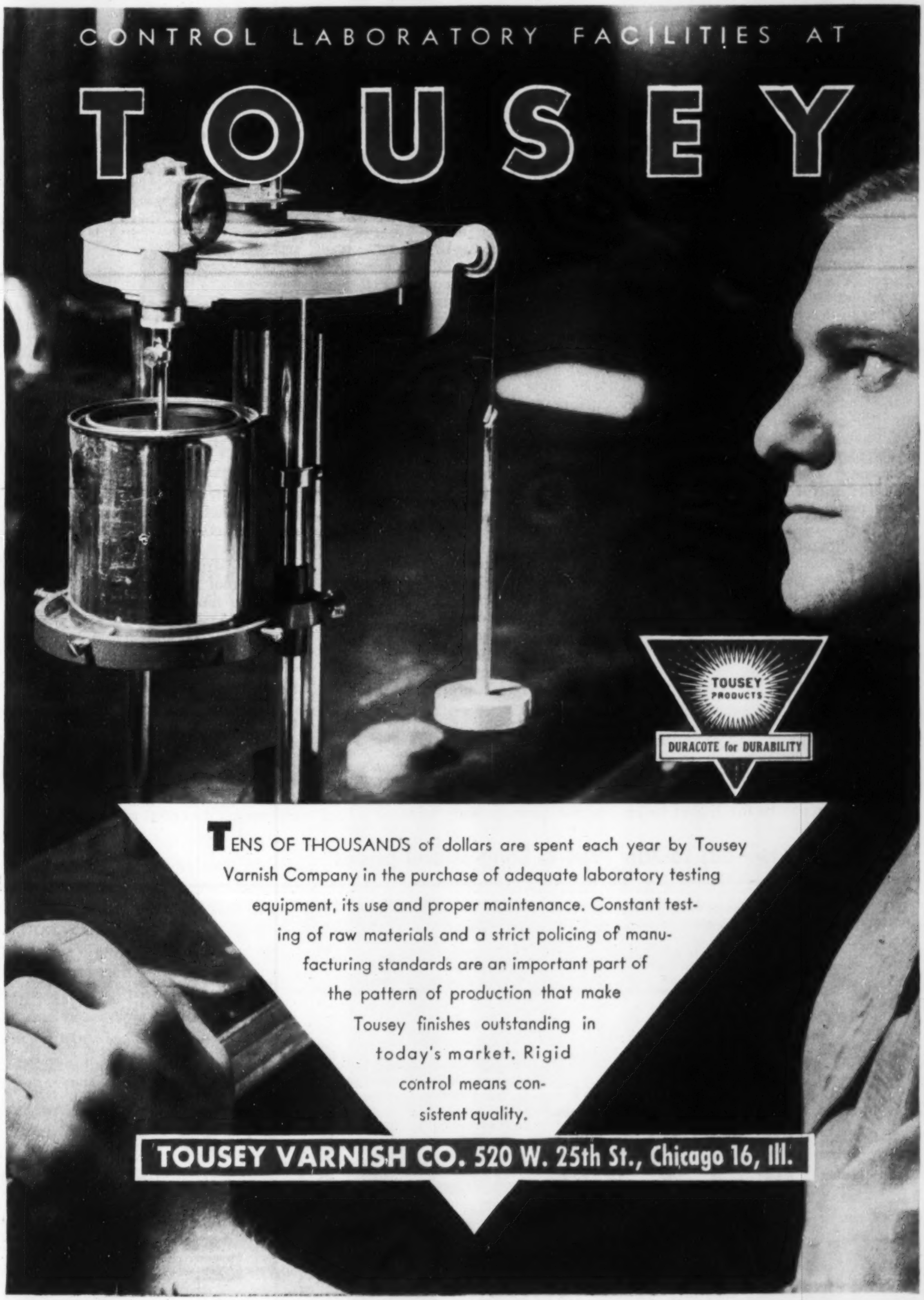
Chimney		
1C	American Chimney Corp., Cincinnati	$22,985
2	Custodis Constr. Co., Inc., Chicago	23,660
10	Fred W. Kaelber, Inc., Long Island City, N. Y.	31,050

On a per-ton-of-capacity basis these costs work out at $1,833/ton for building with block walls, $1,854/ton for brick walls, both equipped with a mechanically stoked incinerator without preheater. The building cost includes driveways and retaining walls. The building alone with block is $996/ton, with brick $1,018/ton. The mechanically stoked incinerator without preheater is $683/ton and the chimney is $153/ton.

River improvement, Wis.

To relocate, widen and deepen its bed and slope the banks of Kinnickinnic River, a small meandering creek, to enable it to carry off storm water, the Sewerage Commission of Milwaukee, Wis. let a $33,872 contract for moving 58,000 cu yd of excavation in 60 working days. The length of the job is about 2,377 ft. Ray D. Leary is chief engineer and general manager. Unit prices received June 15 for work to start July 26, were:

1C	Speedway Contracting Co.	$0.584 per cy
2	Stack Construction Co.	0.72
3	L & L Service Co.	0.85



CONTROL LABORATORY FACILITIES AT

TOUSEY

TENS OF THOUSANDS of dollars are spent each year by Tousey Varnish Company in the purchase of adequate laboratory testing equipment, its use and proper maintenance. Constant testing of raw materials and a strict policing of manufacturing standards are an important part of the pattern of production that make Tousey finishes outstanding in today's market. Rigid control means consistent quality.

TOUSEY VARNISH CO. 520 W. 25th St., Chicago 16, Ill.

Cost comparisons refined by adjusting for both area and time differentials

By John M. Ruddy, P E
Consulting Engineer
Blue Point, L. I.

To set up a reasonable basis for comparing costs of similar types of projects in various parts of the country—even when the construction is done at different times—it is advantageous to combine the two fundamental types of ENGINEERING NEWS-RECORD cost indexes; first those primarily related to location, and second those related to time. The location index is the twenty-one-cities simultaneous cost comparison. The time index is the weekly national 20-cities average cost trend. This method of establishing the probable percentage difference in price of construction between any two localities consists in adjusting the most timely cost index of the closest of the twenty-one cities to each particular locality. These indexes are then further corrected for time—usually upwards—by means of the 20-cities average index for the type of construction involved, whether "heavy" or building construction. This establishes an individual Index Number for each case, tied to the ENR cost index.

The proportion of the difference between these indexes to the lower index represents the amount by which the dollar value of the cost of construction at the locality of the lower index should be increased to reflect probable cost in the area represented by the higher index. The proportion of the difference to the higher index is the amount dollar values should be decreased when going from a higher index area to a lower.

The results, while not intended to be precise, are satisfactory for most preliminary or budget type estimates and estimating units.

The accuracy of this method of approximating costs between localities, rests first on the indexes but more heavily on the assumption that only nominal distortion occurs between a specific site and the closest of the twenty-one cities to it, and between the various twenty-one cities. The final figures should be quite satisfactory, however, for making general weighted comparisons of specific projects or for the preparation of engineering budget-type estimates and unit prices—provided careful judgment is used and the probable accuracy of the various assumptions and data are remembered.

The method works in reverse, too. The school and hospital prices used here to illustrate this method are converted to Long Island, N. Y. costs. The accompanying area costs conversion table shows how they in turn can be converted to prices prevailing in any of the 21-city price-orbits.

All prices shown are tied to January, 1954 indexes or price levels.

Area costs conversion table

Long Island costs shown for elementary schools and hospitals are tied to the ENR cost indexes shown below for January 1954. To get reasonable costs for other areas deduct the percentages shown from the Long Island costs. To up-date for time changes since January 1954 get latest values of the ENR cost indexes corresponding to those shown below

Area of index	Bldg constr cost Deduct from LI costs	Bldg constr cost ENR Index	Heavy constr cost Deduct from LI costs	Heavy constr cost ENR Index
Atlanta, Ga.	32%	394	37%	460
Baltimore, Md.	28%	427	25%	551
Birmingham, Ala.	32%	391	36%	469
Boston, Mass.	25%	433	14%	626
Chicago, Ill.	23%	443	5%	691
Cincinnati, Ohio	25%	435	13%	633
Cleveland, Ohio	24%	439	3%	709
Dallas, Texas	32%	397	36%	470
Denver, Colo.	23%	449	17%	604
Detroit, Mich.	22%	453	5%	690
Kansas City, Mo.	24%	442	13%	630
Los Angeles, Cal.	28%	420	14%	627
Minneapolis, Minn.	19%	468	10%	661
New Orleans, La.	28%	419	31%	506
New York City, N.Y.	13%	505	5%	695
Philadelphia, Pa.	15%	494	9%	666
Pittsburgh, Pa.	21%	460	12%	640
St. Louis, Mo.	21%	457	11%	653
San Francisco, Cal.	32%	397	20%	587
Seattle, Wash.	31%	402	13%	636

Ruddy adjusted Long Island Index: Bldg Cost 580, Heavy Constr Cost 730—Jan. 1954

• School costs

An illustration of how this double price-level adjustment works is given in the accompanying table of school costs. These represent several types of construction:

1-story structurally non-combustible

1-story structurally non-combustible (except roof and its framing)

2-story non-combustible

The adjusted unit costs provide a range for preliminary budget estimating on eastern Long Island.

This study leads to these deductions:

1. Construction costs on Long Island are high, approximately 25% above the national average.

2. It is practically imposible to build now for less than $35,000 per classroom—including in the cost per classroom the cost of the auxiliary

Hospital costs—adj to Jan 1954 & Long Island prices

Total and unit prices are tied to these index values: ENR Building Cost Index 460, Ruddy adjustment for Long Island 580. See table in text for adjusting to price levels in other areas.

No. of Beds	Size				Height	Location	Date Built	ENR index then	Dual adj %+	Cost, Jan '54, LI, NY			
	Cubage	Cubage Per Bed	Sq ft	SF Per Bed						Total	Per sq ft	Per cu ft	Per Bed
15	106,756	8,211	9,096	700	....	Texas	1949	322	80	$284,000	$31.26	$2.66	$21,876
18	231,263	12,847	22,075	1,226	....	Indiana	1949	356	62	475,000	21.54	2.05	26,419
30	401,340	13,378	29,844	994	....	Utah	1949	345	68	708,000	23.71	1.76	23,600
45	365,985	8,133	26,644	592	....	Ohio	1949	344	68	1,027,000	38.54	2.79	22,825
50	500,200	10,004	39,246	785	....	Illinois	1949	349	66	1,260,000	32.12	2.50	25,224
50	489,189	9,800	43,120	862	....	Illinois	1949	349	66	1,207,000	27.99	2.47	24,144
68	588,608	8,656	47,200	694	....	Vermont	1949	322	80	1,800,000	38.13	3.04	26,470
75	654,995	8,733	52,063	694	....	Idaho	1949	345	68	1,342,000	25.80	2.05	17,900
150	1,149,450	7,663	85,333	569	....	Georgia	1949	308	88	2,998,000	35.31	2.62	20,095
76	536,135	7,055	44,919	591	3-St & Gr Fl	N. Y., Oswego	1949	398	45	1,287,000	28.65	2.40	16,941
25	231,700	9,268	......	.....	1-St & Bsm	Pennsylvania	....	279	107	333,000	.....	1.44	13,344
78	....	......	......	.....	3-St & Bsm[1]	Massachusetts	1950	375	54	562,000[1]	.....	....	7,207[1]
20	128,400	6,420	10,698	535	1-St	So. Dakota	1951	400	45	291,000	27.25	2.26	14,580
19	105,000	5,526	9,830	517	1-St & Bsm	Montana	1951	384	51	302,000	30.75	2.88	15,915
50	337,735	6,754	25,780	515	1-St & Par Bsm	Missouri	1951	436	33	715,000	27.73	2.11	14,304
61	345,000	5,655	34,300	652	3-St & Par Bsm	So. Dakota	1951	400	45	1,335,000	38.92	3.86	21,894
266	1,555,200	5,846	128,589	483	4-St & Bsm	Indiana	1951	395	46	4,996,000	38.85	3.20	18,784
30	149,520	4,984	14,240	475	3rd Fl Addn	Illinois	1951	395	46	257,000	18.05	1.71	8,571
44	481,850	10,950	41,464	943	3-St Wing[2]	Colorado	1951	432	34	1,014,000	24.44	2.10	23,060
56	236,012	4,214	20,500	366	1-St & Par Bsm	Missouri	1951	436	33	645,000	31.48	2.72	10,880
100	557,800	5,578	48,650	487	3-St & Bsm	No. Carolina	1951	403	43	1,464,000	30.09	2.62	14,640
										Minimum	$18.05	$1.44	$8,571
										Average	30.03	2.47	19,077
										Maximum	38.92	3.86	26,470

• [1] Mansion converted to hospital, not included in summary • [2] Bsm addn to existing

IH ON THE SUPER HIGHWAYS

Carving out the West Virginia Turnpike

INTERNATIONAL PAYSCRAPERS and crawlers help contractors carve 88 mile roadway through mountainous terrain.

With the opening of the new West Virginia Turnpike, travel distance between Charleston and Princeton shrinks from 110 to 88 miles, a 20% reduction in mileage over a two-lane road that makes driving through the mountains faster and far safer.

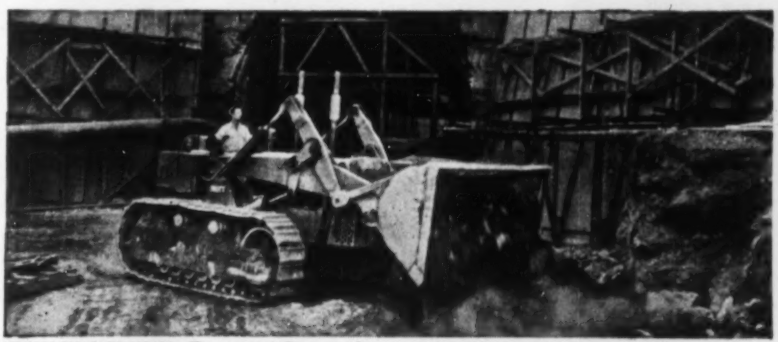
While not as long as some of the other new Turnpikes, this $96,000,000 road-building venture was a rugged test for contractors from the outset with original estimates of 25,000,000 cubic yards of earthmoving increased by mountain slides that required moving more than 500,000 yards of dirt for each mile of highway built in many locations.

This mountainous setting provided contractors with more concrete evidence that INTERNATIONAL tractors—both rubber-tired and crawler—really pay off big when the chips are down . . : when greater power, payload moving capacity and maneuverability are needed in the tight spots.

It takes just 10 seconds to get the low-down on International's greater earthmoving earning power. Simply call your International Industrial Distributor today and he'll demonstrate any of the great INTERNATIONAL tractors with matched equipment right on your job tomorrow.

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

A MOUNTAIN SLIDE nearly doubled the excavation work of the L. S. Coleman Company, St. Albans, West Virginia, in Kanawha County, but two INTERNATIONAL TD-24s and two INTERNATIONAL 2T-75's helped remove the slide in short order.



TITAN IN A TUNNEL. Bates and Rogers Construction Corp., Chicago, find the INTERNATIONAL TD-18A crawler and 3 cu. yd. DROTT Skid-Shovel a great all-around performer in constructing half-mile tunnel between Standard and Fairfield, West Virginia.

LATROBE LIKES 'EM. ***"We put our 3 TD-24s on the tough jobs because of the extra power and speed, their all-around efficiency and stamina,"*** says John Sobotta, grade foreman for Latrobe Road Construction Co., Latrobe, Penn., contractors on 3,000,000 cubic yards of excavation and embankment in Raleigh County.

IH®
INTERNATIONAL
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FOR EVERY MOVE IN EARTHMOVING

Elementary school costs—adj to Jan 1954 & Long Island prices

Total and unit costs are tied to these Index values: ENR Building Cost Index 460, Ruddy adjustment for Long Island 580. See table in text for adjusting to price levels in other areas.

Description									ENR	Dual	Jan. '54 cost on Long Island, N. Y.				
	Classrooms			Room Summary					index	adj			Unit—per		
Type of Construction	Recit	Spec	Adm	Aud a	Gym g	Lib l	Cafe c	Location and date built	then	incr %+	Total	Classroom	Sq Ft	Cu Ft	Pupil
1-st, stl, wd & mas	2	4	23	a	...	l	...	Los Angeles, Calif	375	55	$506,000	$84,300	$23.80	...	...
1-st, br ven, pl conc fl	6	4	21	a	g	l	...	Meunster, Tex 1950	310	87	608,000	60,800	16.82	...	...
1-st, br & stl	6	5	6	...	g	l	...	Plains, Tex 1950	310	87	520,000	47,300	19.00	$1.10	$2,080
1-st, stl, conc & mas	12	1	13	a+c	...	l	wa	Hillsborough, N. J	350	66	600,000	46,100	21.24	1.51	1,285
1-st, stl & mas	20	...	...	a+c	...	...	wa	Maricopa, Ariz	300	93	428,000	21,400	12.40	...	...
1-st, stl, wd & br	7	1	15	a+c	...	...	wa	Yakima, Wash	350	66	362,000	45,200	17.30	1.23	1,500
1-st, br, bl & stl	7	0	3	a+g+c		l	wa	Bohemia, L. I., N. Y	500	16	447,000	63,800	24.80	1.36	2,126
1-st, br & stl	32	6	11	a+g		l	c	Macon, Ga	290	100	876,000	23,058	9.15	...	547
1-st & bsmt, br & stl	12	...	12	a+c	...	...	wa	Kingston, Mass	350	66	557,000	46,400	21.40	1.31	1,547
2-st, stl, conc & conc bl (addn)	6	...	...	...	...	...	c	Lima, Pa 1950	382	52	252,000	42,000	18.10	1.40	1,064
1-st, wd & mas (addn)	12	...	...	...	g	...	...	Hartford, Conn 1950	375	55	521,000	43,416	19.62	...	...
1-st, wd & mas	10	...	...	...	...	...	c	Marin County, Calif 1951	375	55	272,000	27,200	22.33	...	...
1-st, br, wd & stl	14	...	...	a	g	...	c	Manchester, Mass 1951	404	43	1,158,000	82,700	24.13	...	3,217
1-st, mas & stl	7	...	...	a+c	...	...	wa	Hutchinson, Kan 1953	446	30	617,000	88,160	16.50	...	...
1-st, mas & stl	13	...	...	a+c	...	...	wa	Hutchinson, Kan 1953	446	30	444,000	34,153	15.04	...	...
1-st, mas (addn)	5	1	...	a+c	...	...	wa	Lebanon, Pa 1953	439	32	308,000	51,335	18.43	0.86	...
1-st, wd & stl, fr, stuc	20	...	17	...	...	...	...	Vista, Calif	320	81	781,000	39,060			600
1-st, fr & stuc	10	7	9	...	...	...	...	Temple City, Calif	320	81	604,500	35,560	17.78	1.35	1,100
1-st, bl & wd	4	...	1	...	...	...	...	Ridge, L. I., N. Y	500	16	98,600	24,600	17.40	1.50	940
1-st, stl, wd & conc	5	...	3	...	...	...	c	Stillwater, Okla	340	70	143,000	28,600	17.56	...	...
1-st, cind bl, pl, f br, wd	8	1	13	...	...	l	c	Paramus, N. J	450	29	530,000	58,900	...	...	...
1-st, wd fr, part br	16	...	...	...	...	...	...	Clearlake, Ore 1951	384	51	384,000	24,000	13.36	...	800
2-st, br, bl & stl	11	4	3	a+g		l	c	Mastic, L. I., N. Y 1951	500	16	590,000	39,400	19.70	1.02	1,790
2-st, br & stl	10	16	19	a+g		...	...	Middleton, Wis	350	66	766,000	29,500	19.87	1.15	1,613
2-st, br & stl	16	2	...	...	g	...	enlarge exist.	Denver, Colo	340	70	678,000	37,675	20.86	0.96	1,012
2-st, br & stl	13	2	3	a	g	...	c	Baltimore, Md	350	66	1,913,000	127,600	32.53	1.70	3,644
2-st, stl, conc & bl	18	...	9	a+g		...	c	Scottlandville, La	320	81	547,000	30,400	17.58	...	1,093
2-st, stl & conc (gym only)	11	2	12	a	g	l	c	Manchester, Vt	300	93	963,000	74,150	20.55	...	1,900
											325,000	...	15.10	...	...
1, 2 & 3-st, br & stl	20	7	10	a	g	l	c	Elmhurst, Ill	340	70	2,068,000	76,600	21.93	1.43	3,447
1 & 4-st, br & stl	26	19	14	a	g	l	c	Washington, D. C	350	66	2,970,000	66,000	18.90	1.20	2,970
1 & 2-st, br & stl	32	31	35	a	g	l	c	Oak Ridge, Tenn	350	66	4,392,000	69,700	23.06	...	2,927
3-st, br & stl	65	15	16	a	g	l	c	Euclid, Ohio	300	93	6,828,000	85,300	...	1.78	3,790
2-st, mas	15	4	...	...	g	...	c	Cheltenham, Pa 1953	439	32	2,505,000	131,840	22.95	1.28	...
na Cl "A" fireproof	24	18	...	...	...	l	c	Westchester, Pa 1953	439	33	2,005,000	47,753	19.82	1.36	...
1-st, conc & mas	12	5	5	a+g		...	c	Bayport, L. I., N. Y 1953	540	7	652,000	38,353	19.75	...	...
2-st, rein conc	8	1	5	...	...	l	...	San Francisco, Calif	330	76	561,000	62,300	23.63	...	...
2-st, rein conc & br	8	...	6	a	...	...	...	Berkeley, Mo	390	48	530,000	66,200	18.15	...	...
1 &2-st, rein conc & conc mas	24	17	6	...	g	l	c	Wilmington, Calif	320	81	2,400,000	58,500	20.55	1.33	2,800
2 & 3-st, rein conc & br	6	7	8	a+g		l+c		Canton, Mass	350	66	950,000	73,000	20.07	1.64	2,210
2-st, rein conc & br	15	6	...	a	g	l	2c	Mineral Springs, N. C	300	93	2,790,000	133,000	20.80	1.51	...
-st	12	15	...	...	...	...	...	Somers, N. Y 1938	200	190	1,174,000	43,500	22.07	1.37	3,260
2-st	23	18	...	...	...	...	...	Williston Park, L. I 1947	400	45	1,410,000	34,400	23.18	1.29	2,043
2-st	20	30	...	...	...	...	...	Bethpage, L. I 1949	410	41	1,574,000	31,500	20.02	1.25	...
1-st	3	2	...	...	...	...	...	Poundridge, N. Y 1950	410	41	141,600	23,800	18.06	0.90	...
1-st	2½	...	...	...	...	...	...	Van Cort'dville, N. Y 1941	210	176	118,000	47,200	...	...	1,966
2-st	8	...	...	...	...	...	...	New Canaan, Conn 1941	200	190	480,000	60,000	...	...	2,000
1-st	7	5	...	...	...	...	...	Locust Grove, L. I 51-52	500	16	452,000	37,700	20.88	1.45	...
1-st	14 ea	5 ea		2 schools combined				Williston Park, L. I 1950	410	41	1,397,000	36,770	29.03	1.65	...
2-st	24	22	...	...	...	...	...	Middletown, N. Y 1952	480	20	1,687,000	36,700	23.58	1.48	...
1-st	6	...	...	...	...	...	...	Deer Park, L. I., N.Y. 1949	410	41	352,000	58,700	...	0.99	...
1-st	6	...	...	...	...	...	...	L. Ronkonkoma, L. I. 1947J	400	45	426,000	71,000	17.96	1.21	...
1-st	2	5	...	...	...	...	...	Brookville, L. I 1952	500	16	260,000	37,100	35.94	2.27	...
na	11	...	...	...	...	...	...	Woodstock, Ill 1949	349	66	540,000	49,200	20.60	1.47	1,970
na	9	...	...	...	...	...	...	McKeesport, Pa 1949	374	55	486,000	54,000	32.36	...	1,385
na	7	...	...	...	...	...	...	Cleveland, Ohio 1948	352	64	600,000	86,000	31.28	1.81	1,625
na	8	...	...	...	...	...	...	Cicero, Ill 1949	349	66	1,350,000	168,800	31.40	...	3,509
na	13	...	...	...	...	...	...	Troy, Ohio 1949	337	72	854,000	66,200	22.27	1.37	2,153
na	10	...	...	...	...	...	...	Muncie, Ind 1949	350	66	767,000	76,700	...	1.75	1,870
na	12	...	...	...	...	...	...	Wilbraham, Mass 1949	362	60	740,000	61,700	22.90	1.01	1,542
na	13	...	...	...	...	...	...	Elmira, N. Y 1949	398	45	873,000	67,230	31.64	1.27	1,746
na	19	...	...	...	...	...	...	Council Bluffs, Ia 1949	325	78	993,700	52,100	23.86	1.22	1,656
1-st	26	...	...	...	...	...	...	Rochester, N. Y 1950	439	32	1,524,000	58,600	14.94	0.92	1,524
1½-st, average	16.5 av	...	...	...	...	...	...	Aver 20 in N Y State 1950	410	41	...	...	20.76	1.30	...
1-st	25	...	...	...	...	...	...	Massapequa, L. I 1950	410	41	1,103,000	44,200	26.13	1.53	...
na	27	5	...	...	...	...	...	Carle Place, L. I 1949	398	45	1,630,000	50,900	...	1.71	...
na	12	5	...	...	...	...	...	Washington, N. J 1950	439	32	709,000	41,650	...	...	...
na	...	...	...	...	...	...	...	New Canaan, Conn 1949	362	60	1,190,000	...	...	1.31	...
1-st, wd & mas	10	...	3	a+c	...	...	wa	Skowhegan, Me '52-53	422	37	227,000	22,700	14.20	...	412
1-st, wd	14	...	4	a+c	...	...	wa	Bar Harbor, Me '52-53	422	37	396,000	28,296	15.90	...	600
1-st, stl & mas	12	...	2	a+c	...	...	wa	Brewer, Me '51-52	410	41	275,000	22,926	16.48	...	520
1-st, mas & wd	12	...	1	a+g+c*		...	wa	Miami, Okla 1952	410	41	233,000	19,387	14.04	...	...
1-st, mas & wd	12	...	1	a+g+c		...	wa	Miami, Okla 1952	410	41	254,000	21,166	14.61	...	...
1-st, stl & wd	11	...	5	a+c	...	l	wa	Martinez, Calif 1950	389	49	571,000	51,909	17.42	...	...
1-st, br & wd	13	...	4	a+c	...	l	wa	Hudson Falls, N. Y 1952	465	25	645,000	49,015	21.50	1.61	...
1-st, br & wd	13	...	4	a+c	...	l	wa	Hudson Falls, N. Y 1952	465	25	653,000	50,230	21.76	1.63	...
1-st, br & wd (addn)	4	...	...	a+c*	...	...	wa	Hudson Falls, N. Y 1952	465	25	263,000	65,750	25.02	1.91	...
1-st, stl & mas	15	...	...	a	g	l	c	Hartford, Conn 1953	430	34	1,855,000	123,666	...	...	4,122
1-st, stl & mas	9	...	4	a+c*	...	...	wa	Riverdale, N. J 1953	484	20	226,000	25,111	13.07	1.03	...
1-st, stl & mas	7	...	7	1-general purpose rm				Union Township, N. J. 1953	484	20	205,500	29,357	13.80	1.06	...
1-st, stl & mas	14	...	16	1-general purpose rm				Westwood, N. J 1951	457	27	562,000	40,162	19.01	1.39	...
1-st, stl & mas	9	...	14	1-general purpose rm				Montvale, N. J '53 Dec	505	15	308,000	34,233	13.83	0.95	...
1-st, stl & mas	14	...	12	...	...	...	...	Woodridge, N. J 1951	463	25	550,000	39,643	23.33	1.79	...
Same + gen'l pur rm	14	...	12	g p rm $11.73/sf				Same sch w gprm 12,611 sf	...	..	698,000	49,857	19.29	1.45	...

*st story *+ combination *w with ** multipurpose room *na not available

IH ON THE SUPER HIGHWAYS

Pushing Completion of New York Thruway

Contractors get big assist from INTERNATIONAL TD-24s as $823 million super road enters final construction stage.

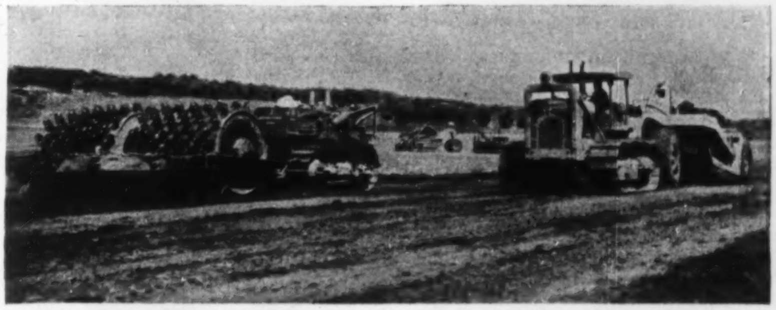
The New York Thruway is now a year from completion . . . 427 miles long with four authorized extensions totaling another 128 miles . . . $823 million projected construction cost . . . approximately 80,000,000 cubic yards of rock and stone to be moved.

Road builders on the Thruway from New York City to Buffalo have banked on INTERNATIONAL TD-24s to keep them on schedule . . . clearing the right of way . . . pulling bigger scraper loads faster than any other crawler . . . pushing elevating loaders . . . push-loading like no other crawler can . . . leveling and compacting fills.

Whether you handle big Thruway contracts or do custom work, your International Industrial Distributor is the fellow for you to call today for demonstration proof of how the complete INTERNATIONAL line of nine crawler and rubber-tired tractors can cut your costs.

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

250 LOADS IN 10 HOURS is the production pace maintained by these 3 TD-24s and scrapers for the Savin Construction Corp., Hartford, Conn., on one of four contracts the firm has on the Thruway in Greene County. Savin uses 7 TD-24s to move 6 million cubic yards.



SUPT. RATES TD-24s TOPS. *"Our INTERNATIONAL TD-24s and scrapers deliver paydirt faster than any others on the job—usually more than 100 loads each in 10 hours,"* says J. P. Connor, superintendent for Smith Construction Company, Pelham, N. Y., subcontractors of 1,500,000 cubic yards of earthmoving.

BEARCATS IN THE BORROW PIT are these two INTERNATIONAL TD-24s used by Arute Brothers, Inc., New Britain, Conn., on two Thruway prime contracts totaling $3,082,905 in Monroe County. Four TD-24s are used for push-and-pull loading and for leveling the fill.

INTERNATIONAL HARVESTER

INTERNATIONAL®

FOR EVERY MOVE IN EARTHMOVING

rooms required by State regulation.

3. Depending on type of layout and construction the unit cost per classroom varies between $35,000 each and $100,000, with $50,000 appearing to be a reasonable budget figure for minimum desirable first cost when maintenance and operation are considered.

Total costs in the tabulation, and in the discussion here, are for construction only, these four contracts: general construction, heating, electrical, and plumbing. No land costs, site work, fees, furniture, or similar items are included in any school project total shown.

A similar tabulation for general hospitals is included for eastern Long Island where the cost per bed varies between $10,000 and $25,000 with $20,000 per bed apparently a reasonable budget figure.

These tables are not intended to be either complete as to type or comprehensive in locality coverage as they were gathered from recent data only to the extent necessary to obtain budget type-figures.

• Limitations of building unit costs

The most useful units for preliminary budget estimates are per-classroom, or per-pupil, or per-bed cost because the number of these units, or the "capacity" needed, is usually the only data available prior to the acceptance of preliminary layouts.

But these unit costs are subject to the same limitations as are the per-square-foot or per-cubic-foot costs that can be applied when plans become available.

Any comparison of square foot or cubage unit costs between the various projects represented in the tables, or elsewhere for that matter, should only be made while remembering the basic weaknesses of the unit definitions. For instance, units such as per pupil, per classroom, or per bed cannot properly weigh the costs of auxiliary spaces and services if these vary much between projects.

Costs based on a per-cubic-foot basis vary widely unless the AIA standard cube is observed throughout. In addition, both per-cubic-foot and per-square-foot figures can be very misleading in that they tend to be higher for the more efficient building space layout, that is where there is a minimum of corridor, attic, and similar less-expensive areas. They are affected also when the ratios change of auditorium or gymnasium space to classroom space.

Here, too, judgment must be exercised in applying these unit prices to preliminary budgets for new facilities.

Airport terminal buildings—unit costs

Civil Aeronautics Administration, Department of Commerce, airport officials and consulting engineers

Airport name and location	Date Built	Size sf	Size cf	EP '53[1]	Cost Total	Cost Per sf	Cost Per cf	Cost Per EP[1]
Bangor-Old Town Mun, Me	47-48	4,057	44,857	16,500	$47,847	$11.79	$1.07	$2.90
Portage Lake Seaplane Base, Me	49-50	495	5,940	na	4,969	10.38	0.84	na
Nantucket Memorial, Mass	1951	5,249	79,760	21,500	104,433	19.90	1.31	4.86
Burlington Mun, Vt	48-49-50	13,766	177,485	19,300	191,251	18.10	1.40	9.91
New Bedford Mun, Mass								
Term bldg	50-52	10,545	135,540	18,200	236,061	22.40	1.74	2.97
Fire & Crash	51-52	3,960	49,200		52,839	13.30	1.08	2.90
Bradley Field, Windsor Locks, Conn	50-52	76,051[2]	944,930	116,200	1,556,650	20.40	1.65	13.40
Broome Co, Binghamton, NY								
Term	50-52	21,339	213,871	35,400	392,565	18.40	1.84	11.09
Maint	1950	7,800	na		(64,443)	(8.24)	na	(1.82)
Clarence E. Hancock, Syracuse, NY								
Tower	48-49	20,403	452,030	148,800	(105,037)	(9.19)	(0.41)	(0.71)
Term	1949	na	122,500		187,543	na	0.53[3]	1.26
MacArthur, Islip, NY	48-49	6,276	75,432	na	110,314	17.58	1.46	na
Malone-Dufort, Malone, NY	47-49	5,423	65,361	784	78,375	14.45	1.20	9.99
Oneida Co, Utica, NY								
Term	49-52	10,479	110,990	22,000	192,873	18.41	1.74	8.76
Maint	50-52	7,176	118,200		(77,958)	(10.80)	(0.66)	(3.54)
Plattsburgh Mun, NY	1950	3,117	43,310	3,300	59,423	19.06	1.37	18.00
Richards Field, Massena, NY	50-52	5,826	66,018	1,800	107,447	18.44	1.63	59.69
Rochester, NY	51-53	41,722	671,229	124,600	880,464	21.00[4]	1.31[4]	7.06
Saranac Lake, NY	48-49	2,657	73,702	4,400	58,283	21.94	0.79	13.24
Watertown Mun, NY	48-49	5,667	61,200	9,500	124,118	21.90	2.03	13.06
Newark, NJ	52-53	153,510	5,067,400	489,400	3,503,292	22.82	0.69	7.15
Allentown-Bethlehem-Easton, Allentown, Pa	48-52	46,491	461,738	20,400	693,484	14.92	1.50	33.99
Bradford-McKean Co, Bradford, Pa	48-49	6,765	81,180	10,200	144,854	21.41	1.78	14.20
Chess Lamberton, Franklin, Pa	51-52	2,407	32,200	3,600	66,479	27.62	2.06	18.46
Emlenton Mun, Pa	50-51	457	4,570	na	10,100	22.12	2.21	na
Greater Pittsburgh, Pa, term	49-53	451,437	6,020,690	585,300	9,288,100	20.50	1.54	15.86
Greenville Mun, Pa	51-53	561	5,610	na	11,973	21.34	2.13	na
Philadelphia International, Pa	50-54	350,000	5,900,000	367,000	7,500,000	21.40	1.27	20.43
Somerset Co, Pa	1952	1,030	16,000	na	22,924	22.26	1.43	na
Wilkes-Barre-Scranton, Avoca, Pa	52-54	11,815	135,920	51,800	219,262	18.56	1.63	4.23
Williamsport Mun, Pa	48-49	14,926	193,865	19,300	205,155	13.74	1.06	10.63
Hazleton Mun, Pa	52-53	2,611	31,000	na	44,677	17.00	1.43	na
Crisfield Mun, Md	1950	521	5,040	na	5,872	11.27	1.17	na
Frederick Mun, Md	48-49	3,530	39,010	na	43,687	12.38	1.12	na
Friendship International, Baltimore, Md	48-49-50	151,917	2,498,746	130,900	4,292,033	28.25	1.71	32.79
Salisbury-Wicomico Co, Salisbury, Md	48-50	6,633	86,340	2,200	134,838	20.42	1.57	61.29
Norfolk Mun, Va	48-51	31,379	464,440	169,200	688,943	21.96	1.48	4.07
Richard E. Byrd Flying Field, Richmond, Va	51-52	37,400	490,000	119,900	636,795	17.03	1.30	5.31
Roanoke Mun, Va	50-51	37,569	553,070	52,900	340,747	9.07	0.62	6.44
Kanawha, Charleston, WVa	48-50	42,813	392,468	104,600	987,000	22.89	2.51	9.43
Martinsburg Mun, WVa	48-49	3,031	38,950	na	37,180	12.27	0.96	na
Parkersburg-Wood Co, WVa	50-52	4,200	61,320	9,000	55,026	13.10	0.90	6.11
Wheeling-Ohio Co, WVa								
Tower	49-51	na	na	16,400	(73,941)	na	na	(4.50)
Firehouse	50-51	1,146	14,400	16,400	(15,694)	(13.69)	(1.09)	(0.95)
Port Columbus Mun, Ohio, tower	1953	na	na	161,400	(287,648)[5]	(28.76)	(2.65)	(1.78)
Springfield Mun, Ohio	51-52	912	10,944	476[6]	13,529	14.83[7]	1.24	28.42
Barkley Field, Paducah, Ky	52-53	7,414	82,500	11,900	148,256	20.00	1.80	12.45
Bowling Green-Warren Co, Bowling Green, Ky	1953	2,464	30,800	2,400	51,454	20.88	1.67	21.44
Hazard, Ky	52-53	2,260	29,400	na	34,708	15.35	1.18	na
Ky Dam State Park, Gilbertsville, Ky	50-52	1,160	14,400	na	25,105	21.64	1.74	na
London Mun, Ky	52-53	4,216	49,680	252[8]	40,000	9.49[7]	0.81	na
Mayfield-Graves, Mayfield, Ky	1952	2,240	29,120	na	31,016	13.85[9]	1.07	na
Owens-Daviess Co, Owensboro, Ky	49-50	6,465	97,000	5,500	71,183	11.01	0.73	12.94
Standiford Field, Louisville, Ky	48-50	30,374	397,055	271,400	681,827	22.45	1.72	2.51
O'Hare Field, Chicago, Ill	49-53-54	115,000	2,000,000	na	1,880,000	16.35	0.94	na
Main building		90,000	1,590,000		(1,100,000)	(12.22)	(0.69)	
Concourse		25,000	410,000		(780,000)	(31.20)	(1.90)	
Weir Cook Air Terminal, Indianapolis, Ind	1954	96,000	na	652,000	1,800,000	18.75	na	2.76
Municipal Airport, Wichita, Kans	1953	76,000	973,000	86,000	1,782,368	23.45	1.832	20.73
San Francisco International, Calif	53-54	317,000	na	5,000,000*	6,769,000	21.36	na	1.36*

* design capacity—max [1] EP Emplaned passengers [2] incl roadway [3] alteration [4] ½ for porches and unfin basement [5] Not final [6] ¾ year [7] cinder blk [8] ¼ yr [9] metal panel

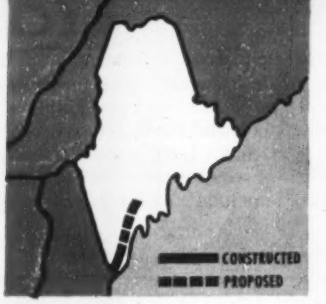
( ) cost included in total   na not available

Airport terminal buildings range in cost from $9.07 per sf to $28.25. They average around $18.75 per sf. On a cubage basis, they range from $0.53 to $2.51 per cf and average around $1.42. A glassed-in concourse costs $31.20 per sf and $1.90 per cf. From examples available, fire and crash buildings cost around $13.50 per sf and $1.08 or $1.09 per cf; towers, $9.19 per sf and $0.41 per cf; and maintenance buildings from $8.24 to $10.80 per sf and from $0.66 to $1.82 per cf.

Emplaned passengers, as a yardstick, has not yet stabilized enough to be useful. The design capacity of San Francisco's new International airport produces a unit cost of $1.36 per EP on the maximum design assumption of 5,000,000 emplaned passengers a year. Terminal building costs based on current traffic flow range from $1.26 per EP all the way up to $61.29.

Possibly design capacity in emplaned passengers could become a useful yardstick for budget estimating.

IH ON THE SUPER HIGHWAYS



Extending the Maine Turnpike

Contractors using fleets of INTERNATIONAL TD-24 crawlers to complete 67.5 mile Portland to Augusta addition

With traffic on the present Maine Turnpike running 10 years ahead of estimates, the pressure is on to complete the 67.5-mile Maine Turnpike Extension from the Portland by-pass to the outskirts of Augusta.

And contractors all along the Turnpike Extension are off-setting a six weeks' delay due to rain in early summer by using fleets of big 155 drawbar horsepower INTERNATIONAL TD-24 crawlers to make the dirt fly . . . hauling dense scraper loads . . . push-loading as no other crawler can . . . towing 50-ton compactors . . . every bulldozing job on the right of way from pioneering to finish grading.

Match the production of these INTERNATIONAL earthmovers against your present equipment tomorrow by calling your International Industrial Distributor today for your on-the-job demonstration.

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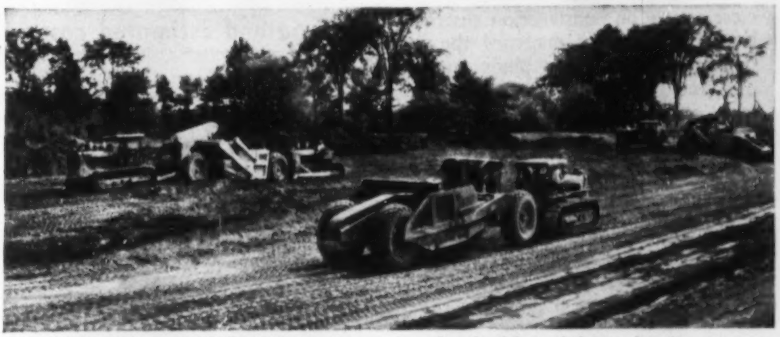
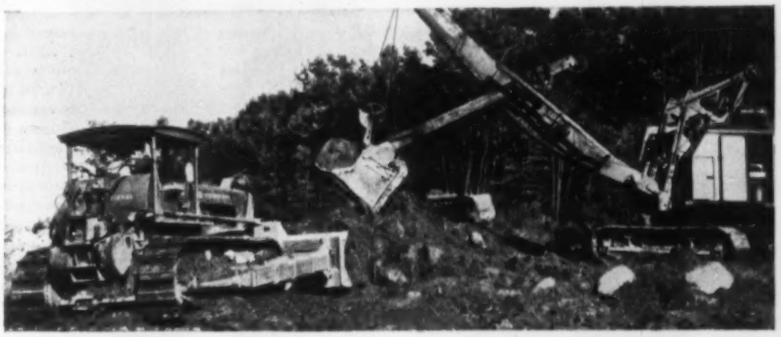
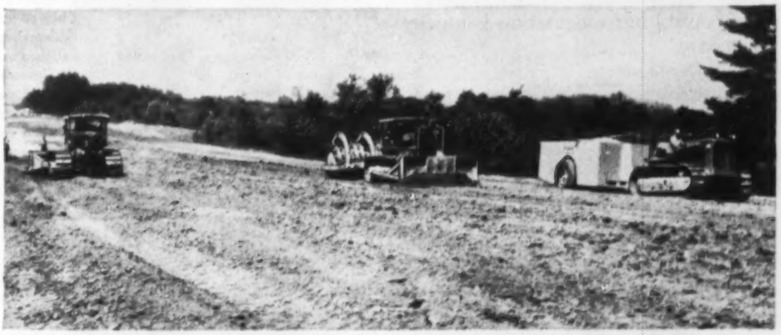


DIGGIN' IN FOR DEMATTEO. *"After six weeks of rain it's mighty nice to see our TD-24s delivering 24 cubic yard payloads to help us get back on schedule"* reports F. L. Kirby, superintendent for DeMatteo Construction Company, Quincy, Mass. Eight TD-24s are on the job.



PACIN' THE BIG DIPPERS. Latrobe Road Construction Co., Inc., Latrobe, Penn. uses three TD-24s on its subcontract with Savin and Supt. F. E. Crowell states, *"The TD-24 is the only crawler, bar none, that's been able to keep ahead of our big shovel operations"*.



IT'S TD-24s 9 TO 5. The Savin Construction Corp., East Hartford, Conn. uses 9 INTERNATIONAL TD-24s on its 10.585 section of the Turnpike to move 2,000,000 cubic yards of earth and 90,000 cubic yards of rock. Three TD-24s shown compacting a fill near Portland.

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What nuclear energy does to construction costs

John M. Ruddy
Chief Engineer
Architectural Planning and Plant
Maintenance Department
Brookhaven National Laboratory
Associated Universities, Incorporated
Upton, New York

Certain aspects of the affect of nuclear energy on construction costs can be segregated, but many of the important and interesting phases are too new and different to permit development of useful estimating units. A nuclear reactor or atomic pile, for instance, is similar in many ways to a large and very special machine installation. Therefore, except for certain building-type components, only the qualitative effect of nuclear energy on construction costs will be considered.

There are two major effects of atomic energy on facilities, and the degree of both depends on the quantities and intensities of radioactive materials involved.

• **Shielding**—The first concerns the protection of people and of detection and control instrumentation against the hazards of radiation (neutrons, beta and gamma rays, which are similar in effect to X-rays).

This requires the erection of shielding of various thicknesses of dense materials; such as regular or heavy aggregate concrete, steel, and lead. These materials in turn require stronger floors, heavier foundations, cranes or other equipment for handling shielding, heavy doors, and maze entrances. In addition, remote handling apparatus and special radiation detection and control instrumentation is usually necessary.

• **Contamination**—The second problem stems from the protection required to prevent the radioactive materials themselves from contaminating people or surfaces (similar in many respects to the precautions required in handling poisonous materials).

This will generally increase the cost of ventilation and air conditioning systems because of the larger quantities of air necessary to insure positive exhaust. Air recirculation is usually impossible, a requirement which more than doubles the refrigeration and related parts of air conditioning systems. The surface finishes of all areas exposed to radioactive materials must be particularly smooth and decontaminable which usually means chemically resistant materials or paints. In addition, the handling of radioactive materials usually develops a special waste disposal problem except where sealed materials are used for radiation only. These effects, together with the usual requirement for special instrumentation, have a substantial effect on the cost of construction.

• **High level protection**—Facilities using very large amounts of radiation shielding or decontamination facilities must be placed in an entirely new construction category. This includes all reactors, irradiators over 1000 curies in strength and the larger experimental accelerators. Installations in which costs of construction are sharply affected include process industries pre-

I—Type and estimated cost of feasible power reactors

Group	Fuel	Neutron energy	Coolant	Moderators	Electric power	Estimated cost reactor only (In Millions)
Commonwealth-Public Service	Natural Uranium	Thermal	Heavy Water	Heavy Water	225MW	$50-60
P. G. & E.-Bechtel	U_{235}	Fast (Breeder)	Liquid Sodium	———	145MW	30-40
Monsanto-Union Electric	Enriched Uranium	Thermal	Liquid Sodium	Graphite	210MW	20-30
General Electric	Enriched Uranjum	Thermal	Light Water	Light Water	300MW	35-50
General Electric	Enriched Uranium	Thermal	Light Water	Graphite	700MW	90-125

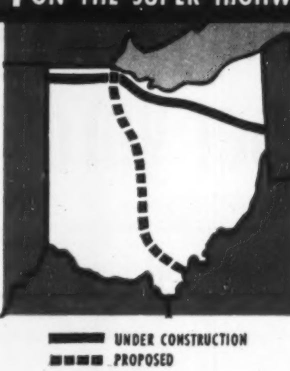
II—Performance and cost of research reactors

Reactor	Location	Date	Type	Power level	Av. thermal neutron flux	Cost (In Millions)
C.P.-1	Argonne	1942	Natural uranium Graphite moderator	100w	4 x 10^{8}	$1.5
C.P.-2	Argonne	1943	Natural uranium Graphite moderator	2kw	1 x 10^{8}	2.0
X-10	Oak Ridge	1943	Natural uranium Graphite moderator	3800kw	5 x 10^{11}	5.2
C.P.-3	Argonne	1944	Natural uranium Heavy water	300kw	5 x 10^{11}	2.0
HYPO	Los Alamos	1944	Enriched uranium Homogenous water	6kw	1 x 10^{11}	0.5
NRX	Chalk River Canada	1947	Natural uranium Heavy water	30,000kw	2 x 10^{13}	10.0
C.P.-3′	Argonne	1950	Enriched uranium Heavy water	300kw	2 x 10^{12}	2.0
BNL	Brookhaven	1950	Natural uranium Graphite moderator	28,000kw	2 x 10^{12}	20.0
LITR	Oak Ridge	1950	Enriched uranium Water moderator	2000kw	1 x 10^{13}	1.0
SUPO	Los Alamos	1951	Enriched uranium Homogenous water	45kw	1 x 10^{12}	0.5
BSF	Oak Ridge	1951	Enriched uranium Water moderator	100kw	1 x 10^{12}	0.25
MTR	Idaho	1952	Enriched uranium Water moderator	30,000kw	4 x 10^{14}	18.0
NCSR	Raleigh	1953	Enriched uranium Water moderator	10kw	2 x 10^{11}	0.5
C.P.-5	Argonne	1954	Enriched uranium Heavy water	1000kw	2 x 10^{13}	3.0

III—Shielding concrete costs

Type of concrete	Density in lbs cu ft	sp. gr	Mix (Portland Cement) coarse aggreg.	Mix (Portland Cement) fine aggreg.	Remarks	Reported cost per cu yd	Date & place	Approx. July '54 % cost increase for bnl	July '54 Est cost per cu yd at bnl	Reference	Bib. No. 1 Item No.
Heavy	218	3.5	Barytes	Barytes	Conventional Placing	$193	Nov. '51 Idaho	+34%	$260	ENR, May 13, '54	1
Heavy	224	3.6	Barytes	Barytes	Pressure Grouted	188	Nov. '51 Idaho	+34%	250	ENR, May 13, '54	1
Heavy	240	3.8	Magnetite		Conventional Placing	160	Apr. '54 Calif.	+35%	220	NAA-SR-880	4
Heavy	215	3.4	Barytes	Barytes	Pressure Grouted	50	May '51	+42%	70	AECU-1835	5
Heavy	260	4.2	Barytes	Shot	Pressure Grouted	160	May '51 Mass.	+42%	230	AECU-1835	5
Heavy	268	4.3	Barytes	Shot	Conventional Placing	200	May '51 Mass.	+42%	285	AECU-1835	5
Heavy	365	5.9	Steel Slugs	Shot	Pressure Grouted	300	May '51 Mass.	+42%	425	AECU-1835	5
Heavy	368	5.9	Steel Slugs	Sand	Conventional Placing	500	July '49 Chicago, Ill.	+62%	800	AECD-3013	3

ON THE SUPER HIGHWAYS



Opening up the Ohio Turnpike

INTERNATIONAL TD-24

crawler tractors preferred by contractors on toughest phases of Ohio Turnpike construction

An estimated 29,506,100 cubic yards of earth and rock is being excavated and an estimated 46,905,000 cubic yards of borrow and fill will be moved before the great new 241.1 mile Ohio Turnpike is completed.

All along the Ohio Turnpike, from the eastern terminus in Mahoning County to the western terminus in Williams County, INTERNATIONAL TD-24 crawler tractors are taking over the toughest earthmoving jobs.

With 155 drawbar horsepower, the INTERNATIONAL TD-24 can conquer any big job. And the durability of every TD-24 means less maintenance, downtime, and operating expense, more profit for owners.

For full details or an on-the-job demonstration with the TD-24 or any of the other six great INTERNATIONAL crawlers and two rubber-tired tractors with scrapers or bottom dump wagon, call your International Industrial Distributor today.

INTERNATIONAL HARVESTER COMPANY
CHICAGO 1, ILLINOIS

HEAP LOADS IN A HURRY. One of Julian Construction Company's seven TD-24s push-loads a new INTERNATIONAL 2T-75 two-wheeled rubber-tired tractor near Wauseon, Ohio. Julian has 1,000,000 cubic yards of dirt to move in sub-grading 7.2 miles of the Ohio Turnpike.

LOADING IN MAHONING COUNTY. Two of D. W. Winkleman's five TD-24s complete fast cycles in spite of soggy going south of Youngstown. Roughly three-and-a-quarter million cubic yards will be moved on this contract.

SPEEDS SOIL-STRIPPING FOR SMALLEY. Approximately 3,600,000 cubic yards of earth will be moved by D. R. Smalley and Sons, Celina, Ohio. One of their three TD-24s is used to pull a loader in the borrow pit near Milan, Ohio.

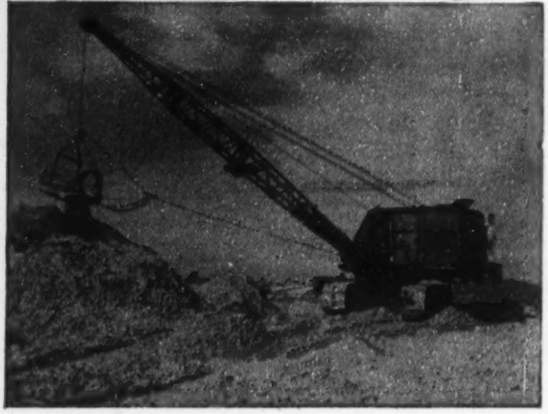
INTERNATIONAL HARVESTER

INTERNATIONAL®

FOR EVERY MOVE IN EARTHMOVING

Any Way You Figure It - dragline yardage - days in service - total cost per yard

Tuffy®
DRAGLINE
cuts costs to minimum!



Draglines operate under conditions that impose a combination of abuses not encountered in other rope service. The structure of Tuffy Dragline adapts itself to this special job. Tuffy's outer layer of wires offers the largest possible area to resist abrasion. Tuffy's inside structure is such as to give plenty of flexibility in casting. As a whole, this combination of pre-shaped strands gives extra-ordinary strength to withstand digging shocks and heavy line pulls.

Whether you're handling wet or dry dirt, sand, gravel or rock, Tuffy Draglines offer a way to cut rope costs substantially—enabling you to bid a little closer against tightening competition.

No More Complicated Specifications to cause confusion in ordering! Just state length, diameter and "Tuffy Dragline!" See for yourself how Tuffy can move more material for *you* for a longer time!

Tuffy Scraper Rope
Plenty flexible to withstand sharp bends . . . plenty stiff to resist kinking when slack . . . plenty tough to withstand drum crushing.

Tuffy Hoist Line
Designed for hoist line use on all types of cranes, derricks and clamshells. Tough, flexible, passes safety checks longer.

Tuffy Dozer Rope
A glutton for punishment on small winch drums and small sheaves. Available in ½" and 9/16" in 150' lengths.

Tuffy Slings
Extra flexible, extra strong because of a patented, 9-part, machine braided wire fabric construction.

union Wire Rope corporation
2228 Manchester Ave. • Kansas City 26, Mo.
Specialists in High Carbon Wire, Wire Rope and Braided Wire Fabric

paring products or by-products of atomic energy, high level (over 1 curie) laboratories, radiography facilities, and isotope dilution suites in manufacturing and medicine.

• **Low level activities**—The buildings least affected are those concerned with low (tracer) level activities where quantities and energies are small. They would include most laboratories concerned with radioactive materials and certain rooms or sections of hospitals, schools, and commercial or industrial establishments.

• **Reactor costs**—If reactor plants are considered, data shows that the costs can vary, for example, between approximately $100,000 for a small 1 kw swimming pool type of reactor (slow flux) for limited experimental purposes, through $15 million-$20 million for a materials testing reactor, to $30 million-$40 million for the reactor part only of power plants as estimated in table 1 by five of the groups presently making feasibility studies. The possible combination, of site, reactor, building, cooling system and shielding for each, makes cost comparisons possible only in specific detail. The cost data in table II represents the range of information from unclassified sources.

• **Unit costs**—Some construction unit costs can be considered specifically. These are first, those rooms or spaces; and second, those building-type components, which are common to facilities handling radioactive materials.

In the first category, space for diluting or processing radioactive materials is usually a requirement. This is known as an isotope dilution room or suite and is usually found where work with radioisotope tracers is done to any extent. Where materials processing of more than approximately 1 curie of radioactivity occurs areas need heavy concrete walls, special drains, once-through ventilation and smooth chemically resistant finishes and they cost between $50 and $75 per sq ft. Facilities for millcurie level work (under 1 curie) cost between $25 and $50 per sq ft.

Counting rooms are another repetitive type of special space and comprise two kinds. Where the radiation to be counted is high enough to be substantially above background, space can be utilized that is special only to the extent of separate and regulated power, special grounding and lights. Such space will cost $25 to $50 per sq ft. A more expensive type must be provided for spaces in which counting rates are so low that the instruments have to be shielded from the background radiation and microwave interference. This requires concrete and screen shields in addition to the above and costs between $50 and $75 per sq ft.

In the same category, laboratories for atomic energy work, either grouped in separate buildings or included with other spaces, cost approximately as follows:

Laboratories—per sq ft

Engineering $50 to $75
Biology & Medical $30 to $50
Chemistry $40 to $60
Physics $20 to $70:

• **Shielding costs**—Of the special building-type components found in most nuclear energy facilities radiation shielding is one of the few susceptible to cost data presentation. Steel and lead shields can be estimated with the usual figures for this type of metal work and are, therefore, not presented. Heavy aggregate concrete, which seems to be increasing in use and which runs between 200 and 400 lbs per cu ft, costs between $100 and $1000 per cu yd furnished in place. (See table III).

A second building-type component of interest concerns surface finishes. In order to avoid the high cost of large areas of stainless steel, glass and ceramics, many chemically resistant paint type finishes have been evolved in the plastic field. The cost of these finishes applied is between one-and-one-half to twice the cost of ordinary lead and oil paint, depending on the roughness of the surface, whether plaster or cinder block, for example.

It is obvious that much remains to be done in collecting and presenting costs in the atomic energy field. Two short bibliographies covering the two special building-type components are included here to assist those interested in further investigation.

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8-story parking unit

Hoist-type parking for 420 cars in a 150'x122', 8-level, reinforced concrete, flat-slab structure will cost Chicago $969,965 or roughly $2,310 per stall. Dick Van Gorp is chief engineer, Bureau of Engineering. Loeble, Schlosman & Bennett are the architects.

The contractor, A. L. Jackson Co., Chicago is scheduled to begin work October 1, 1954, and must complete it by September 1, 1955.

The contract calls for four Bowser type hoists.

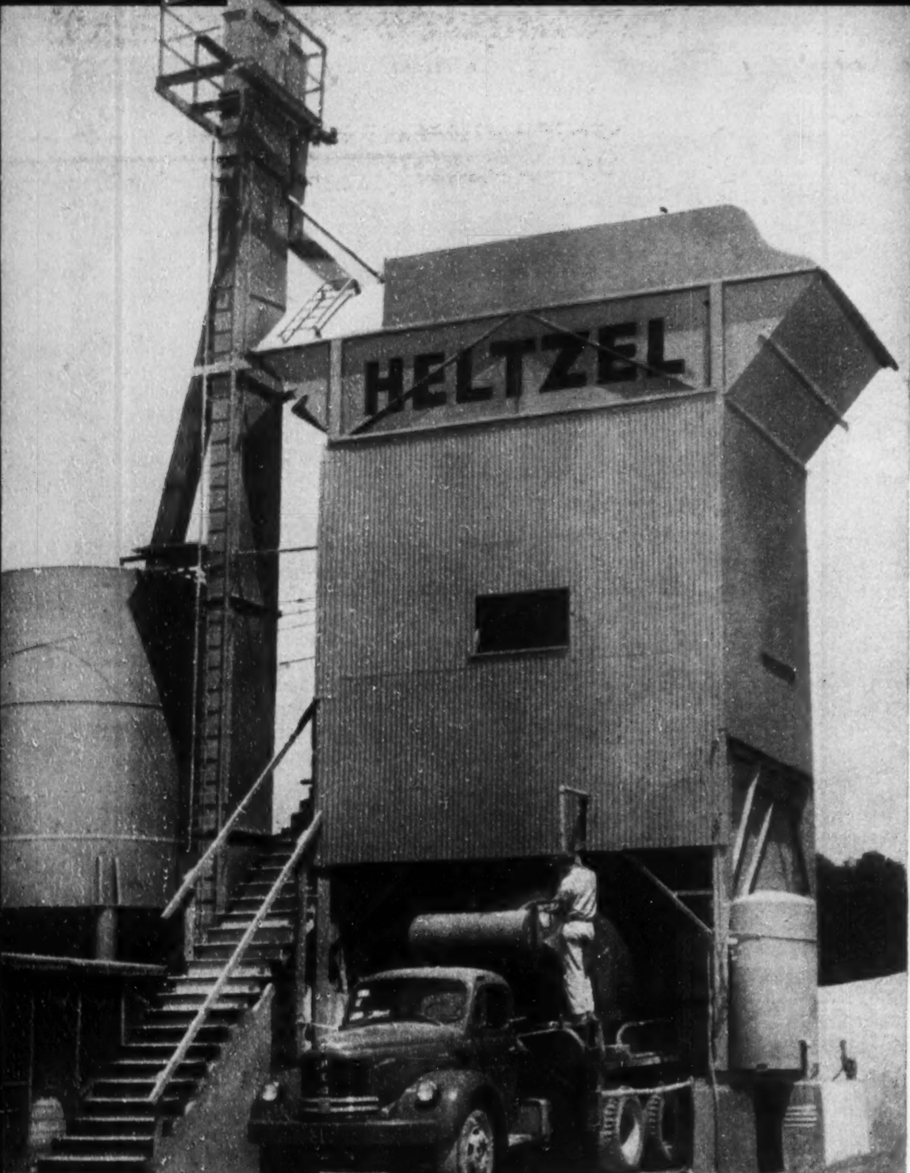
Floor area is 132,350 sq ft which gives a unit cost of $0.73 per sf.

Bidders include:

1C	**A. L. Jackson Co., Chicago, Ill**	**$969,965**
2	**Paschen Contractors, Inc., Chicago 47, Ill**	**980,000**
9	**W. E. O'Neil Constr. Co., Chicago, Ill**	**1,084,313**

Bids: 6-17-54			**Unit Prices**	
Item	**Unit**	**Quantity**	**1C**	**2**
General building work	**ls**	**1**	$334,715	$313,453
Excavation	**cy**	**2,450**	9.65	2.60
Fill	**cy**	**450**	6.40	4.75
Concrete for structure	**cy**	**5,300**	42.15	50.00
Reinf steel	**lb**	**800,000**	0.10	0.10
Treated timber pile—furn	**lf**	**27,600**	1.30	1.35
drive	**lf**	**27,600**	0.42	0.55
Test piles	**ea**	**3**	120.00	200.00
Car hoist system	**ls**	**1**	257,500	260,000

EXPANDING LAKES AREA READY-MIX with MODERN EXTRA-PORTABLE



The pictures on these pages are the two Heltzel Type-Three Batching Plants set into operation recently by the Koder Construction Co. They are both 100-ton, four compartment combination plants. They have three-yard Heltzel Combination Batchers and 250 bbl-per-hour Heltzel Cement Elevators.

New HELTZEL Combination Plants Take Any Size Unmatched Flexi-

The Koder Construction Co., Toledo, O., contracted to supply concrete for a large new housing development. Figuring handling costs from their yard to job site, Koder officials believed an "on-the-job" plant to be the answer. While checking with leading batch plant manufacturers, Koder was introduced to the new *Heltzel Type-Three* portable plant. Especially designed for flexibility of operation, the *Type-Three* is ingeniously unitized for extra fast erection and dismantling and trouble-free over-the-road handling.

Available as a combination cement-aggregate or as a straight aggregate the *Type-Three will take any batcher up to seven yards.* It can be compartmentized to suit job requirements.

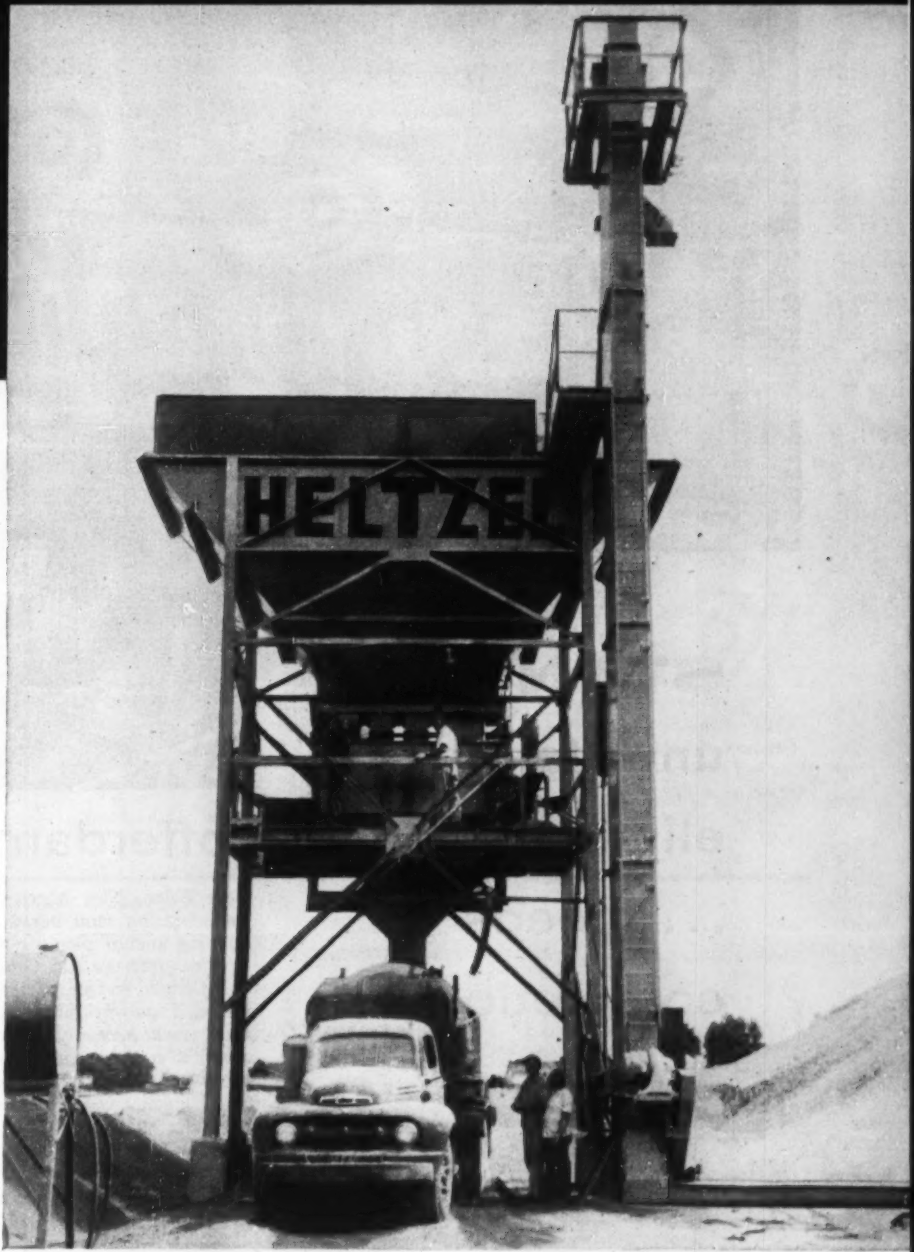
HELTZEL BATCHING PLANTS

THE HELTZEL STEEL FORM AND IRON COMPANY 8800 THOMAS ROAD • WARREN, OHIO

SUPPLIER SLASHES HANDLING COSTS BATCHING PLANTS RIGHT ON THE JOB

TYPE-THREE

Set up in a Hurry
Batcher . . . Permit
bility of Operation



It is equally efficient whether used as a roadbuilders, transit mix, central mix or concrete products plant. And the same plant can be quickly and inexpensively transformed from one type to another.

Koder looked them all over and then bought two *Heltzel Type-Threes* which he erected in different sections of Toledo. He found his *production with the same truck equipment boosted by 33 percent,* his handling costs have dropped correspondingly and his service is vastly improved. Long an advocate of decentralization and "on-the-job" batching as the one sure way to cut costs and improve service, Koder says: "the Heltzel Type-Three is what we've been looking for. It's the ideal plant for those who must have wide batching flexibility."

FIND OUT ALL ABOUT IT . . .

Heltzel engineers, drawing on almost 50 years' experience, believe the new Type-Three to be the most compact, the most efficient, the most flexible plant ever designed. If you use batching plants make sure you know about this great new Heltzel Type-Three. Write — —

THE HELTZEL STEEL FORM & IRON CO., WARREN, O.

Please send Heltzel Type-Three Batching Plant information to

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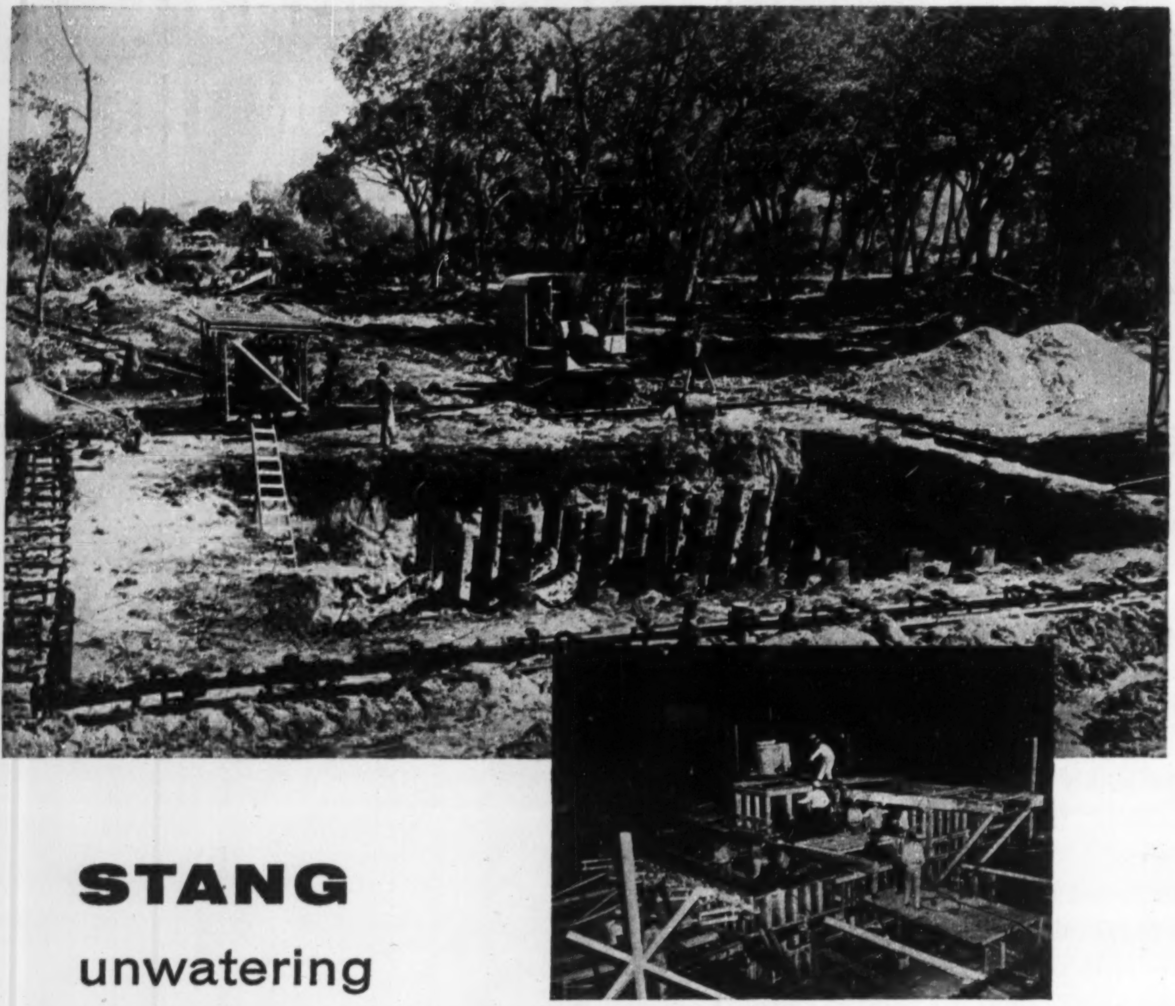

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...speeds
completion!

Near Belen, New Mexico, a deep stratum of fine, water-bearing sand posed a problem for contractor building anchor pier for suspension bridge carrying pipeline over the Rio Grande. After consulting with Stang engineers, an efficient wellpoint system was installed. Then work progressed safely without delay... and *without necessity of a cofferdam of any kind.* Excavation is shown under way after 100 ft. bearing piles were driven. Insert photo shows concreting operation, which was continuous for 36 hours. Unwatering by Stang eliminated danger from uplift, "boils," or sloughing. Call on Stang experience and equipment to solve *your* water handling problem — any size, any type, anywhere. 100-page catalog furnished free upon request.

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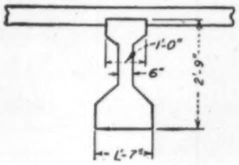
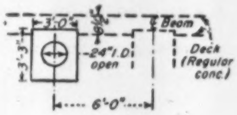
Prestressed concrete bridges compared

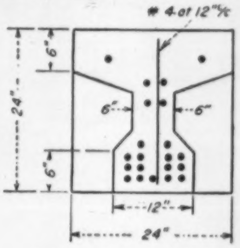
An ENR survey indicates that use of prestressed concrete for highway bridges has spread across the country during the past two years. Nearly every state now has at least one prestressed concrete bridge. The survey also makes available the cost of a number of prestressed bridges for which contracts were awarded in the past year.

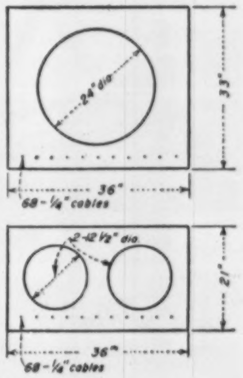
Another interesting phenomenon turned up is that a change appears to be taking place in the methods used by contractors for prestressing concrete beams. Until the end of last year, nearly all prestressed beams were fabricated in place by post-tensioning, the prestress being transferred from the steel tendons to the concrete by end anchors. Since then, the survey shows, there has been a marked increase in pretensioning, a method that requires the placing of concrete in the beam forms after the tendons are stressed and the later transfer of prestress to the concrete by bond. Pretensioning is essentially an off-the-site precasting operation because it requires that the beams be cast between heavy external anchorages. These hold the tension in the steel tendons until the stress is transferred to the concrete.

Unit prices of prestressed concrete bridges

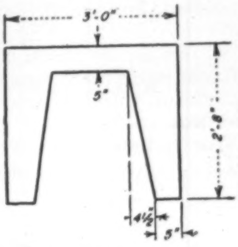


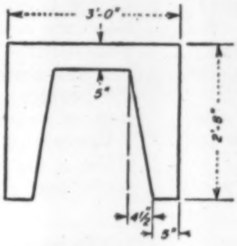


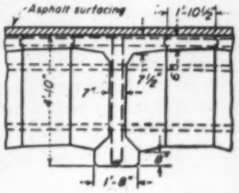


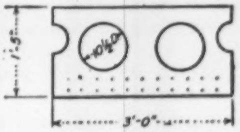


	Project 1	Project 2	Project 3	Project 4
Date of bidding	Oct., 1953	Oct., 1953	June, 1954	April, 1954
Location	Garden State P'kwy, N. J.	Washington, D. C.	Salisbury, Md.	Nr. Charlotte, N. C.
Method	Pretensioned	Freyssinet	Pretensioned	Pretensioned
Loading	H20-S16-44	H20-S16-44	H20-S16-44	H15-S12
No. of spans	8 Bridges	1	6	4
Span lengths	40 to 61 ft	75 ft	40 ft	40 & 51 ft
No. of beams	218	9	114	24 @ 33 in.; 16 @ 21 in.
Tendons per bm	24 to 40—⅜-in. strands	12—18 wires, 0.196-in. dia.	21—⅜-in. strands	68—¼-in. dia.
Price per bm	40-ft.—$820 61-ft.—$1,250	$2,485	$6,360	51-ft.—$640 40-ft. (33-in.)—$542 40-ft. (21-in.)—$360
Price of deck	$3.65 per sq ft	$2.23 per sq ft	$7.95 per sq ft	51-ft.—$4.18 per sq ft 40-ft. (33-in.)—$4.50 per sq ft 40-ft. (21-in.)—$3 per sq ft









	Project 5	Project 6	Project 7	Project 8
Date of bidding	1954	1954	April, 1953	April, 1954
Location	Paint Ck., Kanawha, W. Va.	Nr. Ripley, W. Va.	Louisville, Ky.	Nr. Schnellville, Ind.
Method	Freyssinet	Freyssinet	Freyssinet	Pretensioned
Loading	H20-S16-44	H20-S16-44	H20-44	H20-44
No. of spans	3	2	1	3
Span lengths	60 ft	65 ft	93 ft (14½-deg. skew)	28 ft
No. of beams	....	....	14	8
Tendons per bm	120—0.196-in. dia.	120—0.196-in. dia.	Int. bm. 7—5.16 sq. in. Out. bm. 7—6.48 sq. in.	64—7-wire str., ¼-in. dia.
Price per bm	....	....	$5,408 & $6,107	$500
Price of deck	$12 per sq ft	$13.50 per sq ft	$13.20 per sq ft	$6.74 per sq ft

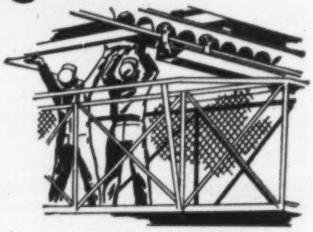
Tramrail CUTS Bridge Building Costs

1. SAVES
Construction Time

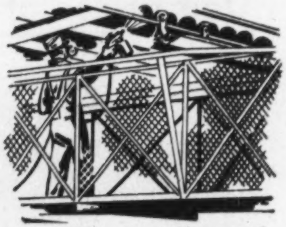
2. SPEEDS
Inspection and Painting

3. SIMPLIFIES
Maintenance

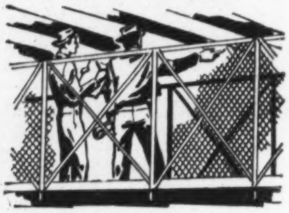
Dalles Bridge over Columbia River between Washington and Oregon. Equipped with a Cleveland Tramrail System including six traveling service platforms operating between piers. The platforms are 36'-6" long and extend beyond the bridge sides.



CUTS concrete form erection time.



SAVES many hours of painting time.



MAKES bridge inspection a simple, easy job.

A CLEVELAND Tramrail Bridge Servicing System can effect such large savings in bridge construction that no bridge builder can afford to overlook this latest development.

The Tramrail installation on the Dalles Bridge over the Columbia River is a good example of this. The equipment was included in the original design. By erecting it in the early stages of construction, the bridge builder was able to pay himself a handsome "bonus" resulting from the efficiency that it brought about.

The equipment made possible savings in several ways. It drastically reduced man-hours required for setting bridge deck forms prior to pouring the concrete. It speeded assembly of many structural members. It simplified placing of electric conduits. It aided bridge inspection and saved a large amount of painting time.

The Tramrail continues to be an important cost-reducing and safety factor now that the bridge is completed. Periodical inspections can be made easily and quickly. Any maintenance underneath can readily be taken care of. Painting and sandblast equipment can be stored on the service platform, making the work easier and, of course, less costly.

Cleveland Tramrail engineers in the principal cities in the U.S.A. and Canada stand ready to serve you.

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ENGINEERING AND APPLICATION DATA

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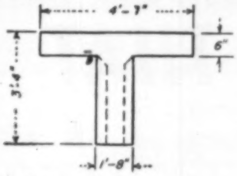
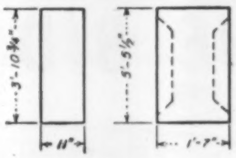
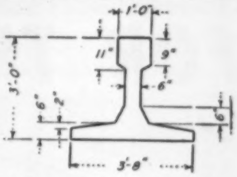
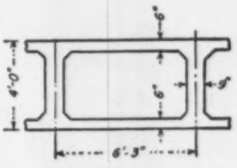
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

Comparison of prestressed bridge prices—continued

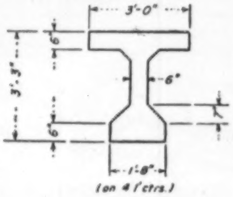


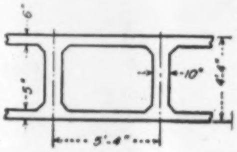


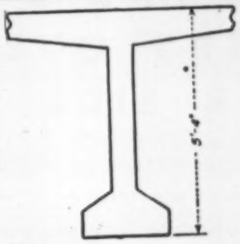


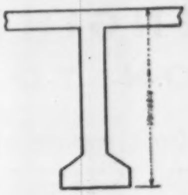


	Project 9	Project 10	Project 11	Project 12
Date of bidding	June, 1954	April, 1954	Dec., 1953	March, 1954
Location	Dallas, Texas	Chambers Co., Texas	Los Angeles, Calif.	Salinas, Calif.
Method	Post-tensioned	Post-tensioned	Prestr. Conc. Corp.	Prestr. Conc. Corp.
Loading	H20-S16-44	H20-S16-44	H20-S16-44	H20-S16-44
No. of spans	3	32	2	2
Span lengths	56	52.5 & 80 ft	48 ft	100.5 ft
No. of beams	42	256	16	14
Tendons per bm	....	52.5-ft.—6—1-in. dia. 80-ft.—10—1-in. dia.	2—10-wire & 1—12-wire, ¼-in. dia.	16—10-wire, ¼-in. dia.
Price per bm	$1,159	52.5-ft—$613 80-ft.—$1,753	....	....
Price of deck	$4.80 per sq ft	$5.60 per sq ft	$7.33 per sq ft	$7.67 per sq ft

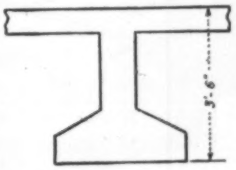


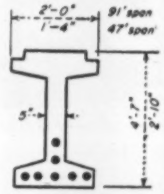


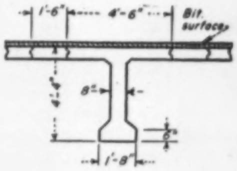


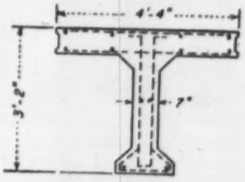


	Project 13	Project 14	Project 15	Project 16
Date of bidding	June, 1954	June, 1954	June, 1953	Oct., 1953
Location	Los Angeles, Calif.	Nr. Los Angeles, Calif.	Gilliam Co., Ore.	Portland-Salem Exp., Ore.
Method	Prestr. Conc. Corp.	Post-tensioned	Freyssinet	Prestr. Conc. Corp.
Loading	H20-S16-44	H20-S16-44	H20-S16-44	H20-S16-44
No. of spans	2	1	3	3
Span lengths	78.75 ft	109.5 ft	98 ft	93 & 101 ft
No. of beams	20	14	15	15
Tendons per bm	9—10-wire, ¼ in. dia.	....	10—18-wire; 2—12-wire, 0.196 in. dia.	13—10-wire, ¼ in. dia.
Price ber bm	....	$8.85 per sq ft	$4,200	93-ft.—$3,600 101 ft.—$4,200
Price of deck	$8.05 per sq ft			









	Project 17	Project 18	Project 19	Project 20
Date of bidding	Feb., 1954	July, 1954	July, 1954	July, 1954
Location	Portland, Ore.	Klickitat Co., Wash.	Marin Co., Calif.	Nr. Guadalupe, Calif.
Method	Prestr. Conc. Corp.	Post-tensioned	Post-tensioned	Prestr. Conc. Corp.
Loading	H20-S16-44	H15-S12-44	H20-S16-44	H20-S16-44
No. of spans	1	5	18	24
Span lengths	97.6 ft	47 & 91 ft	80 ft	50 ft
No. of beams	10	47-ft.—10 91-ft.—15	270	120
Tendons per bm	16—10-wire, ¼ in. dia.	....	....	Int. bm. 5—12-wire Out. bm. 3—10-wire, 1—12-wire
Price per bm	$3,100	47-ft.—$1,200 91-ft.—$3,050	Conc.—$790 Tend. & Stress'g—$560	
Price of deck	....	....	....	$4.37 per sq ft

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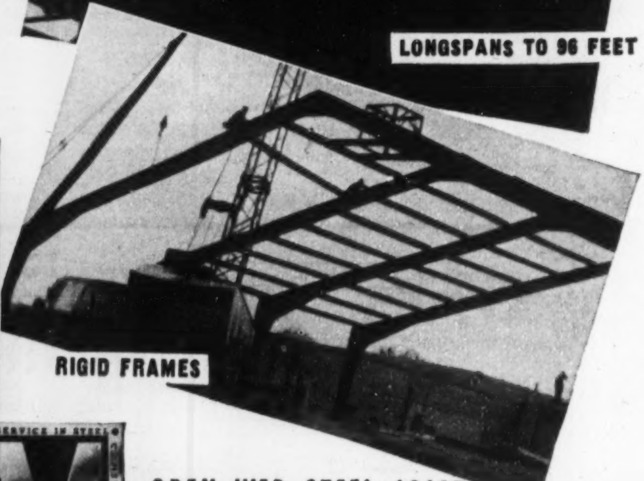

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Prestressed tank bids compare systems

Two tank-reservoirs, one of 12-mg capacity and the other of 5-mg offer contrasts in methods as well as in size. Both are designs of East Bay Municipal Utility District, Calif., which supplies water to Oakland, and which has built 30 prestressed tanks—more than any other agency in the world. One is at Richmond, the other at Los Altos. Bids were taken in 1953 and construction is well along.

R. C. Kennedy is chief engineer of EBMUD. Tank design is under the direction of J. W. Trahern, supervising civil engineer, and was accomplished by C. F. Yerby, assisted by L. H. Lee and V. M. Gallo.

- **Richmond reservoir**—This is believed to be the largest prestressed concrete tank ever built (ENR May 20, p. 32). It is 200 ft in diameter, has 43-ft 8-in. high walls, a dished bottom and a thin-shell dome top. It was designed as a wire-wrapped unit, but alternate bids resulted in a $16,000 saving by using the low bid based on the Freyssinet system.

Erickson, Phillips & Weisberg, Concord, Calif., took the contract at $345,424 against this competition:

1C	Erickson, Phillips & Weisberg, Concord, Calif.	$345,424
2	Elmer J, Freethy, El Cerrito, Calif	351,126
4	Rothschild, Raffin & Weirick and Pacific Bridge Co., San Francisco, Calif	371,753

Bids: 4-10-53 Item	Unit	Quantity	Unit Prices 1 C	2
Exc resv & parking	cy	1,700	$1.65	$1.65
trench & pit	cy	375	5.50	3.00
drain trenches	cy	105	6.60	8.00
Backfill reservoir	cy	360	1.38	2.00
Trim resv surfaces	sf	41,000	0.06	0.04
Sew pipe 6", f&p	lf	580	1.10	1.00
8" tile. f&p	ls	1	2,900	1,321
Cl drain 8", l	lf	55	2.20	3.50
Stee. pipe 30", l	lf	40	5.50	27.00
Conc pipe enc, f&p	cy	113	27.00	20.00
Dr rock, f&p	cy	320	7.15	4.50
Stabil base, f&p	cy	430	22.00	22.00
Imperv membr, f&p—sides	sy	1,990	1.32	1.20
bottom	sy	1,710	1.65	1.60
Conc, f&p—sides	cy	280	38.00	28.00
bottom	cy	190	31.00	28.00
Jts, f&p A & B	lf	3,600	0.40	0.20
C	lf	440	0.40	0.20
Conc, f&p in resv	cy	2,320	63.00	66.00
gutter	lf	485	1.10	1.00
Seal bars & studs, f	ls	1	5,000	5,170
ring & bars, l	ls	1	1,100	945.00
Cement, f (wire wrap)*	bbl	4,320	3.45*	3.75*
(Freyssinet)	bbl	3,770	3.45	n.a.
Pozzolan, f	Cwt	1,330	1.65	1.70
Reinf, f&p	lb	113,000	0.11	0.11
Horiz wrap f&i (wire)*	ls	1	53,600*	58,422*
(Freyssinet)	ls	1	63,900	n.a.
Vert prestr f&i (wire)*	ls	1	33,000*	34,584*
(Freyssinet)	ls	1	36,000	n.a.
Temp prestrs bars i& rem *	ls	1	600.00*	1,300*
Gunite, f&p (wire)*	ls	1	28,800*	28,000*
Downspouts, f&p	ls	1	500.00	200.00
Pipe & fit in vlv pit, p	ls	1	1,650	1,100
Pit cover, f&p	ls	1	800.00	400.00
Misc metal, f&p	lb	6,000	0.44	0.60
Galv pipe 2" i	ls	1	33.00	50.00
Premolded filter, f&p	sf	36	1.10	0.50
Rd pvmt, f&p	sy	520	2.86	2.50
Parking pvmt, f&p	sy	1,000	2.75	2.10
Dome temp, f	ls	1	4,000	2,750
Walkway, f&p	cy	41	10.00	5.50

* Wire wrapping prestress alternate was not used.

Soule Steel Co., San Francisco, is sub-contractor on the pre-stressing. Encased in each of 320 vertical and 370 horizontal pre-stressing conduits are 18 strands of wire. Vertical conduits are 1½ in. steel tubing, spaced every 2 ft. Horizontal cables are 1¾ in. flexible metal conduit, spaced 3½ in. apart.

- **Los Altos reservoir**—This 5-mg tank was prestressed by wrapping high-strength wire around the concrete walls under tension. Bids called for five alternates. Alternate D, without grouting of vertical or horizontal prestress units, produced a $18,147 reduction from the base bid. The award, however, went to Elmer Freethy, El Cerrito, Calif. on the base bid and he sub-contracted the wire wrapping to Preload Construction Corp., New York.

1	L. Neilson, Orinda, Calif	$198,430, alt D, $180,283
2C	Elmer J. Freethy, El Cerrito, Calif	199,353
4	Peter Sorenson Co., Redwood City, Calif	234,394

Bids: 5-22-53 Item	Unit	Quantity	Unit prices 1	2C
Exc resv	cy	20,000	$0.51	$0.45
for 6" drain	cy	10	5.50	8.00
& BF trnch past vlv pt	cy	460	5.00	8.00
Backfill, resv	cy	770	2.10	2.00
Trim resv surfaces	sf	20,400	0.05	0.03
Sew P, 6" f&i	lf	640	1.50	1.25
Drain, 6" f&i	ls	1	822.00	1,271
CIP, 20" l	lf	11	13.10	10.00
16" l	lf	560	8.80	3.50
Cl soil P f&i 6"	lf	30	4.00	4.00
8"	lf	120	5.00	5.50
10"	lf	210	7.60	8.25
Conc encase f&p	cy	25	25.00	21.00
Drain rock f&p	cy	190	6.00	5.00
Stabilized base f&p	cy	235	13.00	20.00
Imperv membrane f&p	sy	2,100	1.63	1.60
Conc floor f&p	cy	285	23.00	28.00
El jt, f&p A&B	lf	1,630	0.20	0.25
C	lf	30	0.20	0.25
Conc resv f&p	cy	1,160	65.50	69.00
outlet f&p	cy	5	68.00	77.00
curb f&p	cy	3	43.30	42.00
gutter f&p	lf	440	1.10	1.00
Seal ring bars f	ls	1	4,000	3,894
l	ls	1	433.00	629.00
Cement, Port f	bbl	2,275	2.50	3.70
Pozzolan f	cwt	715	1.45	1.60
Reinf bars f&p	lb	66,000	0.11	0.10
Horiz wrap f&i	ls	1	28,263	27,555
Vert prestres units f&i	ls	1	12,050	11,550
Temp bars i&rem	ls	1	450.00	500.00
Gunite f&i	ls	1	13,450	7,800
Downspouts, f&i	ls	1	252.00	232.00
Pipe in valv pit i	ls	1	962.00	935.00
Pit cover f&i	ls	1	134.00	333.00
Misc metal f&i	lb	3,000	0.46	0.50
Exp jt filler f&p	sf	80	1.50	0.50
Pavement, f&p	sy	2,070	1.28	2.00
Dome temp f	ls	1	2,800	2,750
Rock walk f&p	cy	55	9.00	8.58
Gate & fence f&i	lf	1	189.00	260.00
CMP 8" f&i	lf	20	2.00	2.00
Temp fence f&i	ls	1	352.00	75.00

Alternates	1	2 C
A Preload Constr Corp—vert prestressing, decreased gunite cover	—$.....	—$2,500
B Preload Constr Corp—reduced vert prestressing, decrease gunite cov	— 8,096	— 7,500
C Prestressed Conc Corp—with grouting of all prestress units	— 7,363	— 1,500
D Prestressed Conc Corp—without grouting of vert or horiz prestress units	—18,147	— 7,200
E Freyssinet	— 622	....

Richardson Bay Bridge prestressing and record size driven piles feature bidding

Precast and prestressed concrete and the highest capacity concrete piles ever used by California State Highway Department color the bidding on this bridge 5 miles north of San Francisco. Half a mile long and priced at $3 million it combines 225-ton piles with 80-ft long precast, prestressed girders. F. W. Panghorst is assistant state highway engineer, bridges.

Also included in the contract are a reinforced concrete box girder and tee beam bridge, construction of highway embankment and a detour that must be graded and surfaced with plant-mixed surfacing on cement treated base. Work must be completed in 500 days.

Because of the very marshy site a minimum of on-the-site work is planned. Six-pile bents on 80-ft centers are connected by 15 T-shaped, 40-ton prestressed girders on 6-ft centers to get a 91½-ft deck width, two 40-ft, 3-lane roadways plus walks and dividing strip. Additional details on the design were reported in ENR 7-29-54 p 26. More detail on the prestressing will be found in the accompanying article in this issue on bridge prestressing costs.

The overall bidding follows which resulted in a contract for Duncanson-Harrelson Co., Richmond in joint venture with Pacific Bridge Co., San Francisco:

1C	The Duncanson-Harrelson Co. and Pacific Bridge Co., Richmond, Calif	$3,017,427
2	Healy-Tibbitts Constr. Co., San Francisco	3,067,094
8	Guy F. Atkinson Co., So. San Francisco	4,045,068

Bids; 7-21-54 Item	Unit	Quantity	Unit Prices 1	2C
Rem traffic strips	sf	800	$0.40	$0.50
Clear & grub	ls	1	10,000	8,000
Exc, roadway	cy	58,400	0.80	0.90
struct "A"	cy	4,250	13.00	9.00
"B"	cy	720	10.00	9.00
ditch & channel	cy	1,080	2.00	2.00
Backfill, struct	cy	1,825	2.00	4.00
Dev water supply & furn water equip	ls	1	1,000	1,000
Apply water	Mgal	1,340	3.50	3.50
Finish roadway	ls	1	1,000	2,500
Portland cement	bbl	240	5.30	5.00
Mix spread & compact	sy	2,800	0.40	0.40
Mineral aggregate	ton	910	2.60	3.00
Asph emulsion	ton	38	40.00	45.00
Screenings	ton	17	10.00	12.00
Plant-mix surface	ton	4,940	6.50	7.00
Treated Doug fir timber	Mfbm	2	600.00	500.00
PCC "A" foot block	cy	2,925	15.00	22.00
struct	cy	17,750	60.00	65.00
column bells	lf	1,650	40.00	40.00
"E" prestress girder	cy	5,205	41.00	46.00
Conc railing	lf	6,195	5.00	6.00
Misc iron & steel	lb	130,000	0.40	0.40
Furn pile—treat Doug fir	lf	2,520	1.65	2.00
10" steel	lf	39,380	3.00	3.25
225-ton BP.	lf	21,064	14.00	15.00
Drive piles—timber	ea	56	60.00	40.00
10" steel	ea	478	150.00	140.00
225-ton BP	ea	238	1,000	325.00
10" steel pile splices	ea	525	30.00	15.00
Load test 225-ton BP.	ls	1	10,000	6,000
Metal plate guard rail	lf	65	5.00	5.00
Salv & reconstr, above	lf	200	3.00	3.00
CMP 16 ga 12"	lf	80	3.00	3.00
18"	lf	20	5.00	5.00
Bar reinf stl	lb	5,125,000	0.085	0.095
Rem exist bridge	ls	1	16,530	25,000
Prestress stl & prestress oper	ls	1	150,000	150,000
Hway light & illum sys	ls	1	15,000	16,000

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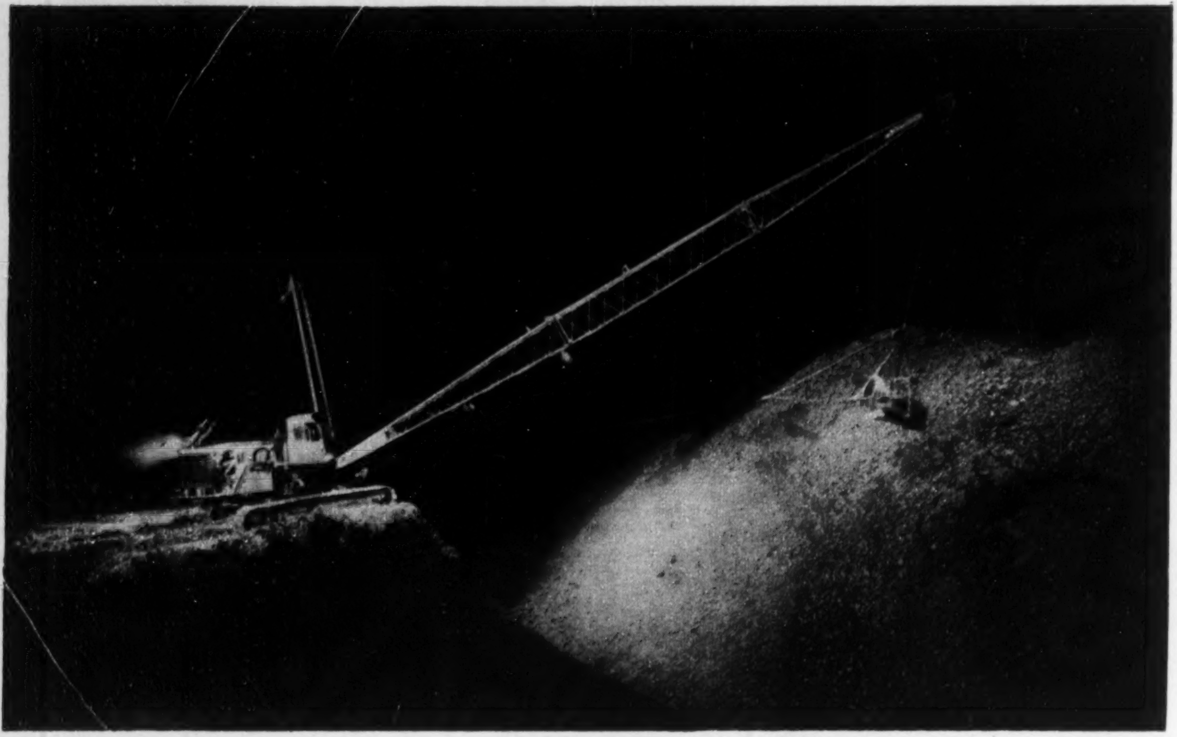

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This dragline moves mountains . . . *around the clock,* puts in close to 24 working hours every day! When the night shift takes over, so does the Onan Electric Plant which is mounted right on the dragline itself, supplying power for floodlighting the entire work area.

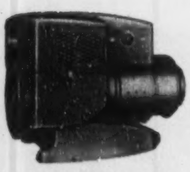
High-intensity lights at several points on the boom and transport unit throw light in every direction helping maintain day-time job progress while eliminating night-time hazards.

Plenty of light is the key to profitable night operations. Where space for mounting an electric plant is limited or weight is a factor, you get more light from an Onan Electric Plant. Take the Onan Model 10CW for instance. It delivers 10,000 watts, yet requires less than one cubic yard of space and weighs much less than many other electric plants of similar capacity.

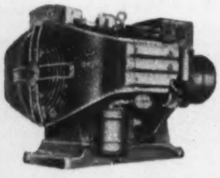
On construction contracts where time is money, Onan Portable Electric Plants can give you the extra working time you need to beat the schedule.

Write for folder showing the complete line of Onan Electric Plants.

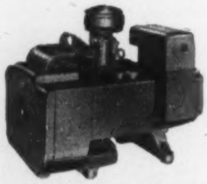
The Onan 5,000-watt Model 5CW is mounted at the boom end of the dragline in limited but adequate space. Two-cylinder, air-cooled engine is extremely quiet running.



Model 305CK, 3½ KW. Two-cyl. air-cooled, gasoline engine.



Model 5DRP, 5KW. Two-cyl. air-cooled Diesel engine.



Model 10CW, 10KW. Two-cyl. air-cooled gasoline engine.

Air or water-cooled
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GASOLINE-POWERED
AIR-COOLED: 400 to 10,000 watts
WATER-COOLED: 10,000 to 50,000 watts

DIESEL-POWERED
AIR-COOLED: 3,000 and 5,000 watts
WATER-COOLED: 15,000 to 55,000 watts

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To cut costs:

Give workmen the weekly cost picture

Paul Pape and J. M. Curlee
F. H. McGraw and Company,
Paducah, Ky.

Competition among the work crews of various job areas proved an important factor in reducing construction costs on the $1-billion atomic energy project that F. H. McGraw and Company now is completing for the Atomic Energy Commission at Paducah, Kentucky.

Vital to this competitive spirit is detailed and realistic cost accounting and analysis—and rapid reporting back to the field. Although the immensity of the project seemed to foredoom the objective of rapid reporting to the field, the goal was achieved by a decentralization technique.

To appreciate fully the problems of cost control on the Paducah project, one must have some idea of its size. At its peak, in 1952-53, the job employed nearly 23,000 people, the vast majority of whom were in the field. Almost all of the building trades were employed on the job. Though security regulations will not permit disclosure of the actual amounts of materials used it is obvious that thousands of yards of concrete were placed and millions of pounds of steel set, not to mention the mazes of piping and electrical materials that went into this vast building project.

The modus operandi for reducing costs at Paducah was of course the customary analysis and control. However, employing cold and conventional procedures at Paducah was not enough. There were thousands of men concerned and hence the human approach was essential. It is one thing to analyze the working productivity under a microscope but quite another to be able to increase that output from what was shown on the slide.

• **What's the score?**—At the core of the human-relations approach was capturing the interest and attention of supervisory and lower-level personnel. This required presentations in such forms as to be easily understood at those levels. Cost pictures of the worker performance, portrayed as graphs and curves, were found to be more easily understood than tables.

A prominent display of these cost pictures at craft headquarters indicated the performance by each craft group or combination of groups, providing interesting topics for discussion and creating competition between groups. Some men watched the posting of their group performance in a manner similar to that of baseball fans watching a scoreboard. Prompt recognition and commendation by Management of cost reductions spurred supervision and groups to drive their production records upward with the net result that unit cost usually decreased or leveled even in the face of a 20% rise in wage rates.

The performance comparisons between groups engaged in the same operations spurred closer coordination and developed better sequences of craft operations. Overlapping of craft work in restricted areas was reduced. Improved techniques and utilization of material became possible in many cases, with resultant cost savings.

• **How to pinpoint responsibility**—A well defined scope within definite limits of work is necessary in order to obtain clear-cut costs and to prevent craftsmen from assuming that the scope encompasses other crafts, thus feeling that their craft cost is not accurately stated. A breakdown of particular unit costs at the craftsman, foreman, or superintendent level is carefully examined to avoid inclusion of costs not pertinent to particular operations. The extent of the inclusion of fringe items of indefinite scope is reduced insofar as possible. The clear definition of scope not only resulted in elimination of alibis, but also enhanced the construction man's personal interest in "the job".

Target dates and cost curves were set up by Management during the early phase of the project, after a thorough study of similar construction had been made. Most of these performance standards were attained by step-by-step improvement and the standards were confirmed as gages in analyzing later project phases.

• **The cost-reporting system**—Behind such dramatization of costs to the workmen — with its attendant incentives to more efficient productivity—is a cost-reporting system that is similar to that of other big jobs in all but one important respect: decentralization, which makes possible the quick reporting of live, up-to-date cost statistics back to the men.

In setting up the cost-accounting and control the first item to get detailed attention was labor, which is a critical expenditure requiring rigid control. An outline of the reporting for labor costs will show how the whole system works.

Manpower requirements were estimated, scheduled and controlled in a manner to build up to peak requirements and taper off in accordance with the decline in project requirements. Further processing of labor costs may be outlined as follows:

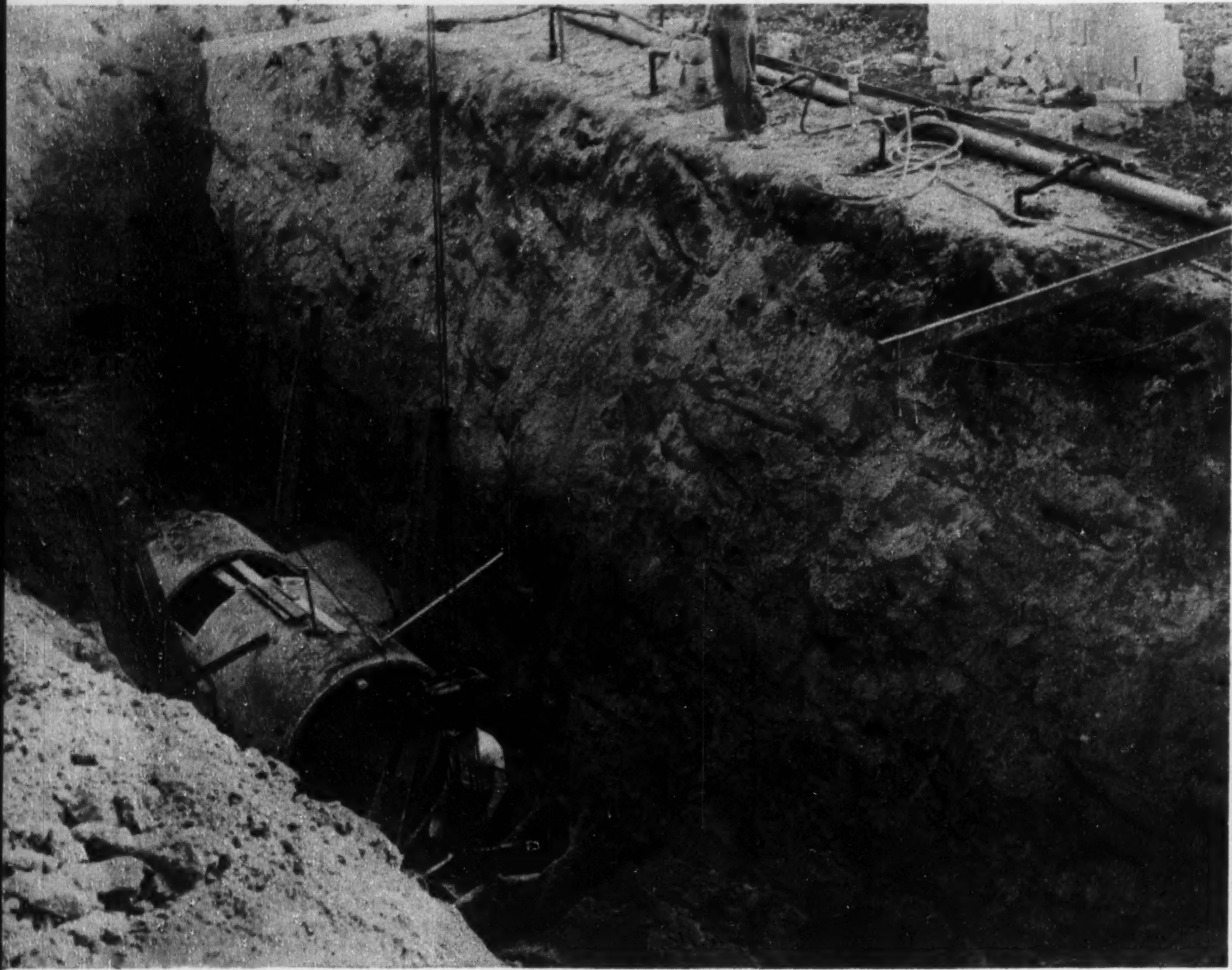
- The foreman charges labor costs directly to each man's time card by job description in order that cost engineers may code or charge it to the related cost account.
- Cost engineers code time cards, from the descriptions given above, in accordance with a cost manual.
- A system of mechanized accounting inscribes, classifies, and summarizes the charges by dollars and manhours into a weekly craft analysis, which is then sent to the cost engineers and others for their use.
- The cost engineers use the cost figures as summarized in accumulating the cost to the pertinent cost accounts.
- The accumulated costs are distributed as previously determined into direct and indirect costs and reported on a monthly Consolidated Cost Expenditure, Liability and Estimate Report.

This CCEL&E Report is used to show the cost estimate of the project and features of work, the costs incurred and commitments, the estimated cost to complete, and the overruns and underruns. It is scrutinized by Top Management to determine the cost trends and trouble spots on the project, the end objective being to keep costs at a minimum and in line with budgets, allocations and targets. Close contact is maintained with the construction and engineering personnel as well as actual field operations to see that plans and procedures are being carried out and also that construction progress is consistent with expenditures.

The costs are broken down into two major classifications, namely: direct and indirect costs. Direct costs consist of the construction labor or productive work on permanent buildings, facilities and sitework embodied in the project area, whereas the indirect costs consist of costs applicable to general overhead, temporary construction, and the operations required of the contractor in the construction of, but not directly applicable to, permanent buildings and facilities.

Indirect costs are carefully reviewed each week to prevent "catch-all" tendencies and to keep each department apprised of indirect labor under its control. Non-manual labor costs

Wellpoints Wring 10 Feet of Water Out of POWDER-FINE SAND



Contractor: Gabes Construction Co., Sheboygan, Wisconsin

Excavating a 15′ trench in very fine, water-bearing sand and silt with hard blue clay at subgrade can be quite a problem. So much so that the first attempt to build a storm sewer in this particular area of Sheboygan, Wisconsin, was abandoned.

A call for help to our Chicago Office brought our guarantee to put the job on its feet—in the dry.

In short order a Moretrench Wellpoint System gave the contractor a dry safe subgrade—freedom to excavate as he chose—a chance to cut costs by eliminating bracing and sheeting and all the other innumerable expenses of a wet job.

When you pump with Moretrench, count on a real saving in *final* pumping costs.

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Canadian Representative: Geo. W. CROTHERS Limited, Toronto, Ontario

follow a similar pattern and are controlled by budget setups and a weekly review and control of the trend in respect to total manpower.

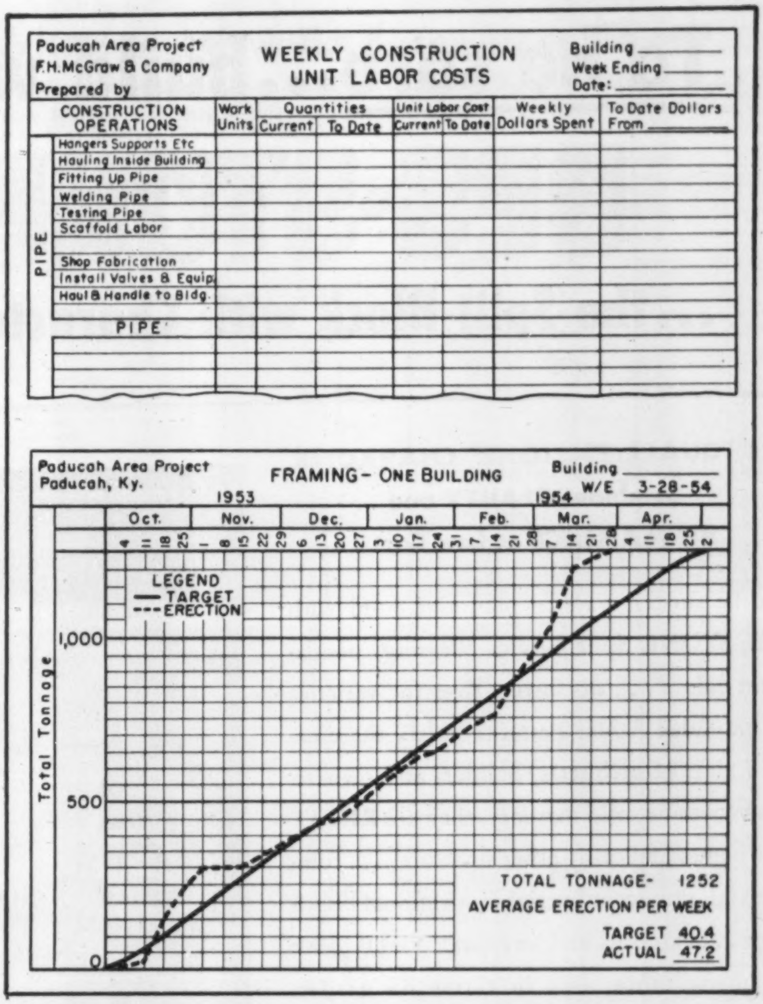
• The communication problem—The rapid dissemination of cost information contained in the reports is essential and poses a problem, especially when project control is desired. Because of the magnitude of the project, considerable time normally lapses between the receipt of the time cards from the foreman and the final analysis by the cost engineers. In some of the more sensitive cases this is obviously too long and with a large number of buildings and features, each of which is a multi-million dollar project in itself, these reports become formidable reading matter for any but the initiated.

To improve the rate of communication, particularly for the sensitive spots, these men study and review the regular comprehensive reports with regard to their relationship to estimates, progress of work, and manpower usages. Items of work that show signs of exceeding normal costs are immediately reported to supervision and management so that prompt remedial action can be taken at a level of authority where it will be most effective.

• Enter decentralization—While it became evident that a clear cut picture of costs, as taken from the basic accounting system, is satisfactory for management purposes, it is slow to gravitate to the man doing the job and who is in a position to effect savings. This is where decentralization came in.

A study indicated the advisability of decentralizing the cost operations by assigning a group of cost engineers to the field to supplement the usual control methods used on the basic system, the objective being to establish the important touch with the men doing the job. These men profit by actual contact with all phases of the work on which they are reporting. They encourage further cost consciousness and enthusiasm among the workmen on the job, present the simplified cost pictures to the workers, make special definitive analyses of certain "multiple-assembly-line" operations, and they accelerate the time interval between card coding and the final reporting analysis.

One of the major features of the decentralization, described in the opening paragraphs, is the effort of management to convey cost-trend interpretations in such a manner that they spur improvement in construction techniques. It would be a mistake to let the information degenerate



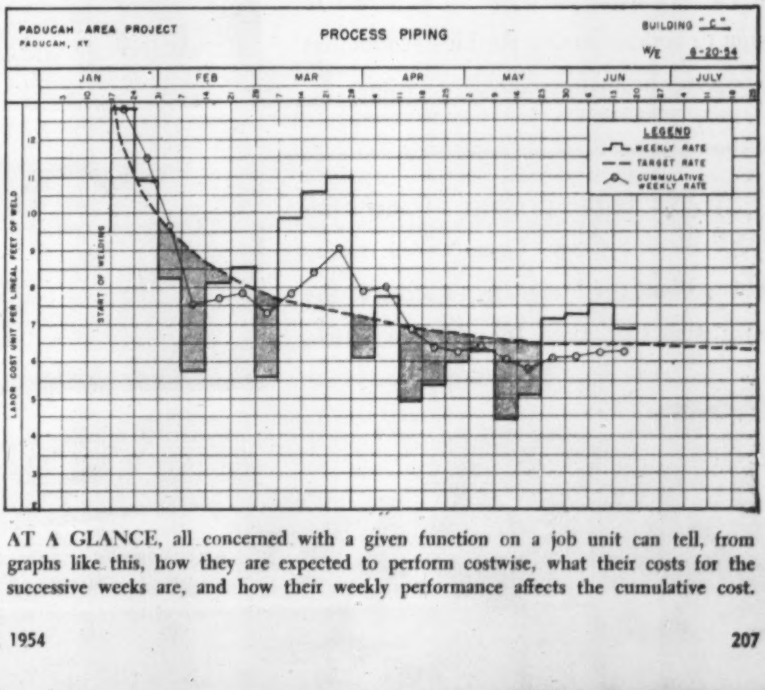
Paducah Area Project
F.H. McGraw & Company
Prepared by

WEEKLY CONSTRUCTION UNIT LABOR COSTS

Building ______
Week Ending ______
Date: ______

	CONSTRUCTION OPERATIONS	Work Units	Quantities		Unit Labor Cost		Weekly Dollars Spent	To Date Dollars From ______
			Current	To Date	Current	To Date		
PIPE	Hangers Supports Etc							
	Hauling Inside Building							
	Fitting Up Pipe							
	Welding Pipe							
	Testing Pipe							
	Scaffold Labor							
	Shop Fabrication							
	Install Valves & Equip.							
	Haul & Handle to Bldg.							
	PIPE							

RAW MATERIAL for weekly cost pictures is found in standard forms like these. Weekly labor costs (upper) show extent of task breakdown. Steel-erection graph (lower) is readily understood by workmen and it yields data for pictorial comparison with progress on nearby work units.



AT A GLANCE, all concerned with a given function on a job unit can tell, from graphs like this, how they are expected to perform costwise, what their costs for the successive weeks are, and how their weekly performance affects the cumulative cost.

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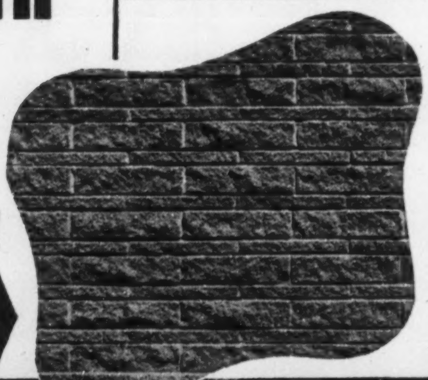

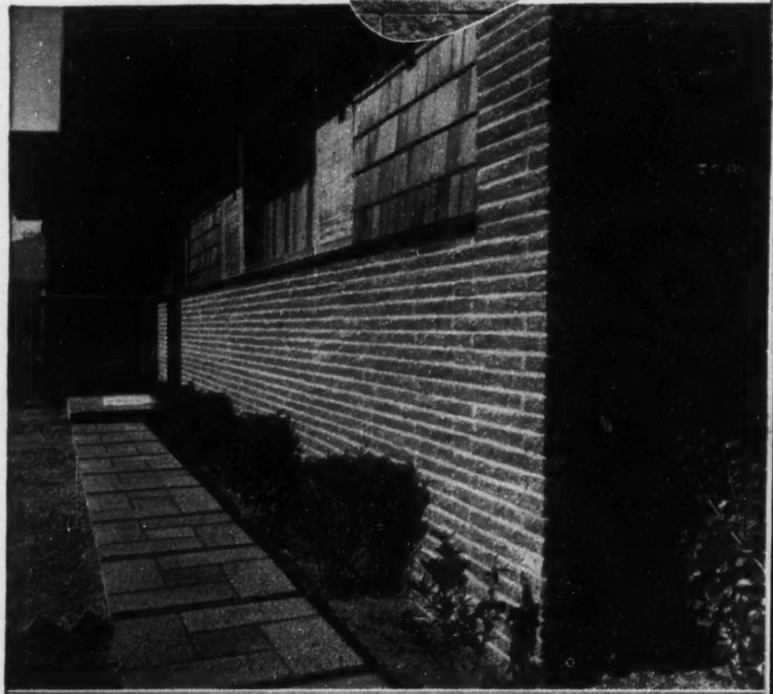

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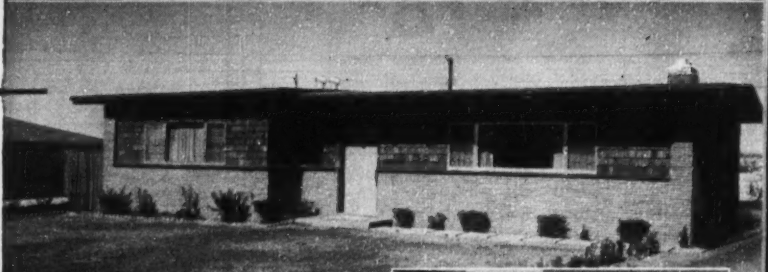

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into mere bases for criticism. Thus, with team work of supervisory personnel and a firm management policy established, cost analysis serves to assist direction of work on the project.

Major benefits obtained by the improved communication through decentralization include development of time saving techniques, deviations in construction requirements, and decentralization of material storage.

• **Time savers**—One of the operations that allowed a reduction of the manpower work load is concrete pumping which, after a study of operation costs, were substituted for the conventional bucket and buggy style of concrete placing of floor slabs. Foremen and superintendents developed teamwork in the floor slab operation until waste motion in the construction sequence was practically eliminated.

Automatic welding of pipe, the elimination of fittings by the use of bends, the erection of longer assemblies of pipe, the construction of jigs, forms, and movable shops and scaffolds were all effective in reducing costs on repetitious work and are examples of operations which cut months off the construction schedule and dollars off the budget.

Deviations in construction requiring alternate methods of obtaining the same end results desired by the Architect-Engineer were studied and suggested for the Atomic Energy Commission's consideration and approval in order to effect economics or accelerate the construction performance.

The decentralization of material storage areas and the maintenance of materials at the approximate use area greatly reduced the waiting time for delivery and use resulting in a corresponding reduction in cost.

• **Safety pays**—It is interesting to note that safety also contributes its part to cost reduction. Lost time on this project was minimized by a rigid safety program and enthusiasm was maintained by competition between crafts, over monthly contest periods, culminating in the presentation of awards to the crafts experiencing the lowest lost-time accident record. As with cost-trend information, a scoreboard was used to indicate daily progress of crafts in contests. The safety contests had various designations to match the athletic seasons, such as baseball, football, and horse racing, etc. F. H. McGraw & Co., through the vigor of its safety program, earned three National Safety Council Merit Awards and one Honor Award and as a result experienced reduced costs through lower insurance premiums, and in so doing reduced lost time due to accidents.

Where water works & sewerage $s go

Water & Sewerage Industry & Utilities Division, Business & Defense Services Administration, U. S. Department of Commerce—1952

Item	Water supply Total	Water supply Treatment plant	Water supply Distribution and other	Sewage disposal Total	Sewage disposal Treatment plant	Sewage disposal Collection and other[6]
Total, in thousands	$1,000.0	$1,000.0	$1,000.0	$1,000.0	$1,000.0	$1,000.0
Labor	272.1	280.0	271.0	301.5	279.8	305.3
Overhead, profit, equipment charges	164.1	152.3	165.7	194.6	172.9	198.5
Supplies	16.5	19.5	16.1	22.5	8.7	24.9
Explosives	0.6	0.2	0.7	1.2	0.1	1.3
Fuels, (coal, coke, petroleum products)	10.5	8.9	10.7	10.3	5.0	11.3
All other, including small tools	5.4	10.4	4.7	11.0	3.6	12.3
Materials	547.3	548.2	547.2	481.4	538.6	471.3
Metal products	319.1	151.3	342.0	125.5	121.8	126.2
Bolts, nuts, washers, rivets	0.9	0.4	1.0	1.1	0.6	1.2
Castings, iron and steel	8.1	1.2	9.1	15.3	1.0	17.9
Forgings, iron and steel	0.2	0.6	0.1	0.3	1.0	0.1
Hardware	0.3	0.9	0.2	0.3	0.6	0.2
Hydrants and valves[1]	61.3	27.2	66.0	5.1	8.3	4.5
Lead	2.6	0.4	2.9	0.6	0.6	0.6
Metal doors	1.2	3.7	0.8	0.9	3.2	0.5
Nails and spikes	0.2	0.3	0.2	0.5	0.6	0.5
Pipe and fittings	193.6	44.5	213.9	22.3	42.5	18.7
Cast iron	126.8	29.4	140.1	15.8	29.9	13.3
Wrought iron and steel	50.9	14.6	55.8	3.9	8.3	3.1
Copper and other nonferrous metals	15.9	0.5	18.0	2.6	4.3	2.3
Plumbing fixtures & supplies, excl. pipe	1.1	5.4	0.5	1.0	1.3	1.0
Sheet metal[2]	0.6	3.1	0.3	0.6	3.2	0.1
Steel reinforcing	12.2	43.8	7.9	47.1	36.8	49.0
Steel, structural	6.6	5.5	6.7	20.4	9.7	22.3
Tanks and towers	27.1	9.0	29.6	0.3	1.9	.....
Wire and wirework products	0.3	0.5	0.3	3.0	2.8	3.0
Iron and steel products, not elsewhere classified	2.8	4.8	2.5	6.7	7.7	6.6
Machinery and equipment	115.7	296.8	91.0	81.5	258.8	50.2
Electrical equipment (motors, generators, apparatus)	5.0	6.7	4.8	5.6	12.9	4.3
Electrical wiring devices & fixtures	5.0	20.1	2.9	4.0	10.4	2.9
Elevators and elevator equipment	0.5	4.1	....	0.1	0.7	....
Heating and ventilating equipment	1.8	5.7	1.3	1.6	5.0	1.0
Pumps and pumping equipment, incl prime movers	22.0	79.4	14.2	28.8	73.3	21.0
Sewage waste treatment equipment	....	....	....	37.0	146.7	17.6
Water meters, regulators, gauges[3]	59.3	15.7	65.2	3.4	5.6	3.0
Water softening & treatment equip[4]	20.1	151.0	2.2	....	....	....
Foundry and machine shop products, not elsewhere classified	2.0	14.1	0.4	1.0	4.2	0.4
Stone, clay and glass products	92.9	82.4	94.3	203.3	125.6	217.0
Brick and hollow tile	5.2	8.7	4.7	9.4	9.3	9.4
Cement	10.4	34.5	7.1	64.8	57.7	66.0
Asbestos cement pipe	48.4	0.4	55.0	5.3	0.3	6.2
Clay pipe	0.5	1.2	0.4	32.4	4.5	37.4
Concrete pipe	16.4	2.0	18.4	34.1	4.5	39.3
Marble, granite, slate	0.9	2.8	0.6	0.4	2.6	....
Sand, gravel, crushed stone	10.0	30.1	7.2	54.8	41.3	57.2
Stone, clay and glass products, not elsewhere classified	1.1	2.7	0.9	2.1	5.4	1.5
Lumber products	5.7	10.0	5.1	24.2	18.6	25.2
All other materials	13.9	7.7	14.8	46.9	13.8	52.7
Expansion joints (hemp, jute and other joint compounds)	2.3	2.3	2.3	2.4	0.7	2.7
Paints and varnishes	1.1	1.6	1.0	0.7	2.6	0.4
Paving materials and mixtures	9.2	1.5	10.3	41.8	3.0	48.7
Roofing materials	0.8	2.0	0.6	0.3	0.3	0.2
Rubber products	0.5	0.3	0.6	0.4	1.8	0.1
Materials, not elsewhere classified	....	....	....	1.3	5.4	0.6

[1] Includes also butterfly valves, sluice gates, plug and cone valves, check valves, yard hydrants, and water service fittings. [2] Includes plate and sheet for pipe fabrication. [3] Includes automatic valves and regulators. [4] Includes chlorinators and chemical dosing machines. [5] Includes supply impoundage, transmission, storage, and about 2 percent in treatment plant which is not possible to separate. [6] Includes interceptors, pumping, outfall lines, and about 10 percent in treatment plant which was not possible to separate.

Materials and equipment account for 55 percent of the waterworks dollar, labor for 27 percent. Of the sewerage dollar, materials and equipment take 48 percent, labor gets 30 percent. The remaining 18 percent of the waterworks dollar and 22 percent of the sewerage dollar go for overhead, profit and construction equipment and supplies.

These averages emerge from a new study prepared by Walter L. Picton, deputy director, Water and Sewerage Industry and Utilities Division, of the Business and Defense Services Administration of the Department of Commerce with an assist by the Industry Division of the Department of Labor.

Information was assembled and correlated with earlier similar analyses of construction expenditures made by the Department of Labor, Bureau of Labor Statistics, the Department of Commerce, U. S. Public Health Service, and the Water Resources Division of the National Production Authority.

Although labor wage rates have increased since the last previous study, in 1948, the percentage of total cost going to labor is less in 1952. This new study is not strictly comparable with the previous ones since more complete coverage this time includes direct purchases by public works departments and utilities of equipment, pipe and other materials and supplies.

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DORMITORY AT CLEMSON COLLEGE was built for $8.65 per sq ft, using the lift-slab method of construction.

Tilt-up and lift-slabs offer cost-saving opportunities

The relatively new precast concrete techniques involving erection of wall panels by tilting them up and of floors by raising them with jacks have been found to be useful and economical in a number of instances. Cost figures follow on several typical jobs.

• Tilt-up walls

Swinerton & Walberg, general contractors in San Francisco, based on their experience with tilt-up walls, estimate that for a warehouse 60 x 200 ft involving panels 20 ft wide and 24 ft high, comparative costs would line up as follows:

8-in.-thick block wall—$1.15 per sq ft
8-in.-thick poured-in-place wall—$1.50 per sq ft
6-in.-thick tilt-up wall—$1.10 per sq ft

These include the concrete columns.

The tilt-up costs can be broken down as follows:

Concrete	$0.37 per sq ft
Forming, reinforcing, bond breaking	0.33 per sq ft
Erection	0.13 per sq ft
Columns	0.27 per sq ft
Total	$1.10 per sq ft

For other types of building using the tilt-up technique, different costs will, of course, result. An industrial plant recently built by S&W at Palo Alto, Calif., cost $1.50 per sq ft. Here, there were bond beams to cast with the walls. Also, the building floor slab could not be used for casting the tilt-up panels, and off-site casting tables had to be built. On the other hand, a 25,000 sq ft warehouse for Zellerbach Paper Co. at Stockton was built with a wall cost, including columns, of $1.00 per sq ft. And S&W figures that costs could be shaved even more if there were a group of several such warehouses instead of just one.

Costs in the same general range, considering that they do not include the columns, were obtained on a 320 x 400-ft warehouse-type building in Salinas, Calif., where the tilt-up walls figured out at $0.91 per sq ft. The building was designed by Falk and Booth, architects and engineers of San Francisco, and constructed by Barnhart Construction Co. of Santa Clara for Growers Container Corp. The 72 tilt-up panels were 6 in. thick, 19 ft wide and 24½ ft high. Several of the panels included windows. The cost breakdown was as follows:

Concrete	$0.30 per sq ft
Reinforcing	0.15
Formwork	0.21
Lifting and bracing inserts in place	0.09
Bond breaking and wiring	0.04
Erection	0.03
Aligning and bracing	0.05
Dry packing at bottom	0.04
Total	$0.91 per sq ft

• Lift-slabs

Costs of the Youtz-Slick patented lift-slab method for floors have not been as generally separated from the total building cost as have tilt-up walls. Nevertheless some idea of their magnitude may be gained from the following estimate prepared by Lift Slab, Inc., of San Antonio, Tex., comparing conventional and lift slab costs per square foot:

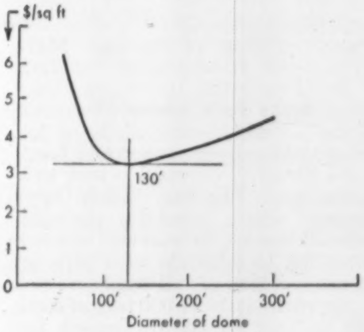
(Based on 1951 prices. Comparisons shown still valid)	8" Conventional Slab	8" Lift Slab
Reinf. steel in place	0.50	0.45
Concrete in place	0.30	0.24
Finishing	0.10	0.05
Forms and Shores	0.50	0.03
Columns in place	0.14	0.14
Collars in place	0.04	0.05
Welding collars	0.02	0.02
Slab separation in place	....	0.02
Lifting	....	0.24
Total	1.61	1.24

Costs of the lift-slab portions of actual jobs are not available, but the total square-foot costs of a dozen jobs that included this new technique supplied by Lift Slab, Inc., are:

Factory, 1 and 2 story, 41,000 sq ft	$6.10
Exhibit building, 1 story, 36,000 sq ft	9.05
Supermarket, 1 story, 13,200 sq ft	7.37
Housing, 2 story, 256,000 sq ft	6.35
Library, 2 and 3 story, 25,000 sq ft	10.45
Dormitory, 2 and 3 story, 28,500 sq ft	9.43
School addition, 1 story, 9,920 sq ft	8.37
Office building, 2 story, 8,000 sq ft	12.38
School addition, 1 story, 9,924 sq ft	8.67
School, 1 and 2 story, 28,000 sq ft	7.60
Hospital (incl. equip.), 4 story, 34,975 sq ft	17.84
Warehouse, 1 and 2 story, 108,000 sq ft	3.98

It may be noted that the housing project listed in the table included 44 buildings, some of which were built with conventional formed-in-place slabs. The cost was $7.26 per sq ft as compared with $6.35 for lift-slab.

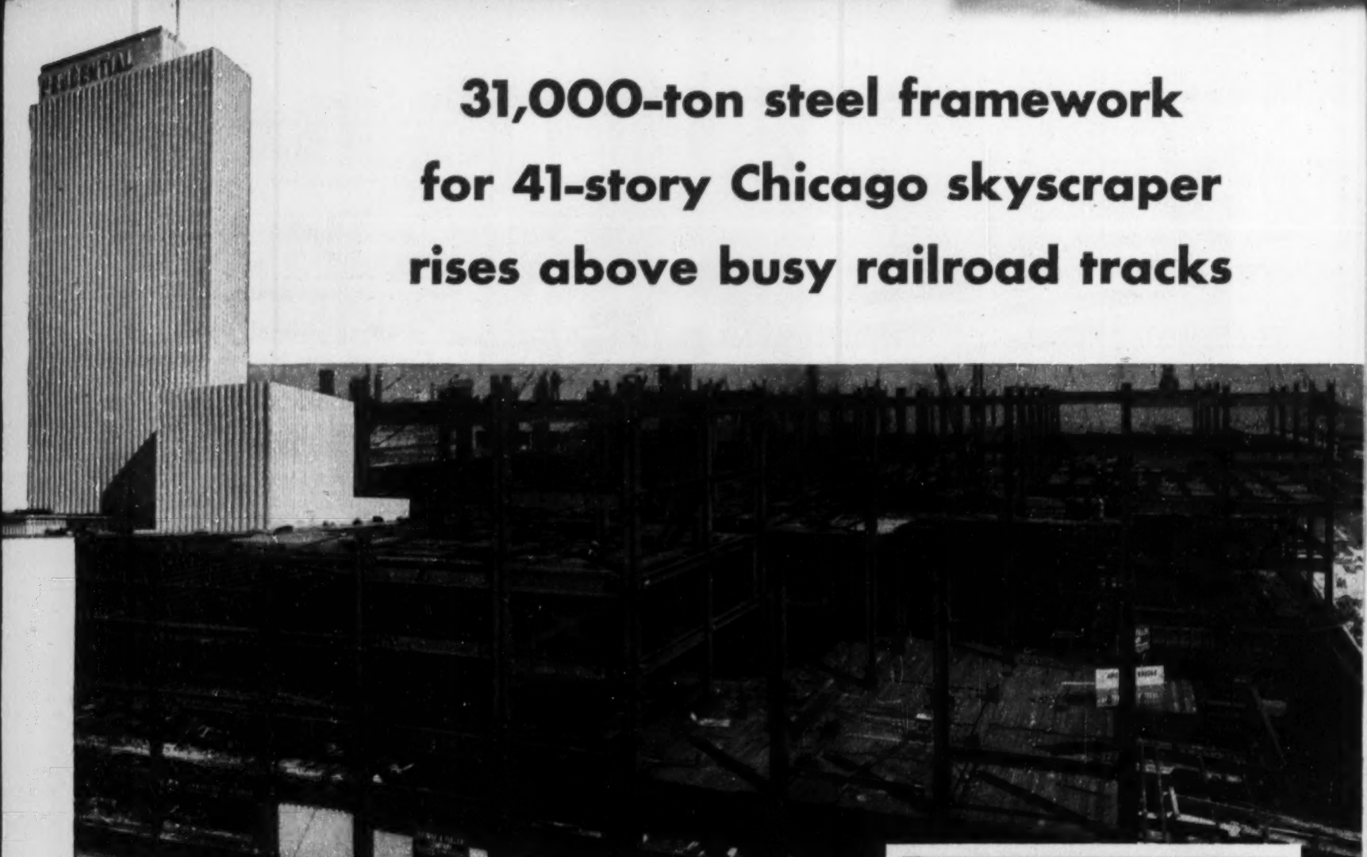
Cost savings for lift-slab construction have also been reported by the Daniel Construction Co., Greenville, S. C., for a 5-story dormitory building at Clemson College. Said to be the largest lift-slab job undertaken to date (513,000 sq ft), the bid price was $8.65 per sq ft, or about $4,500,000 total. Daniel estimates that the cost would have been $4,750,000 if lift-slab had not been used.



Costs of dome roofs

Chart developed by M. Fornerod, general manager and chief engineer of Precast Building Sections, Inc., indicates how cost per square foot of dome surface area varies with span for thin-shell reinforced concrete domes. Considerable variation from these costs can result from local conditions.

31,000-ton steel framework for 41-story Chicago skyscraper rises above busy railroad tracks



AMERICAN BRIDGE safely handles difficult construction problem with minimum interruption in rail traffic

CONSTRUCTION of the new Mid-America Headquarters building of the Prudential Insurance Company, being built above 18 tracks of the Illinois Central Railroad located at Michigan Avenue and Randolph Street in Chicago, is now well under way. The big, 600-ft. skyscraper, which straddles eighteen railroad tracks, is moving upward according to schedule with little or no interruption of rail traffic.

Approximately 31,000 tons of steel will be used for the framework for this tall, modern structure—all of which is being fabricated and erected by American Bridge. It will take 125 American Bridge men about one year to erect the big steel columns, beams and girders for the towering structure.

When completed next year, the Prudential Building will rank among the world's most outstanding office buildings. And it will take its place alongside the Empire State Building, the Chrysler Building, the United Nations Headquarters, and other notable American Bridge structures from coast to coast.

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AMERICAN BRIDGE

AMERICAN BRIDGE

PRUDENTIAL LIFE INSURANCE COMPANY BUILDING
Chicago, Illinois

Architect and Engineer:
Naess and Murphy, Chicago

General Contractor:
George A. Fuller Co., Chicago

Steel Fabricators:
American Bridge

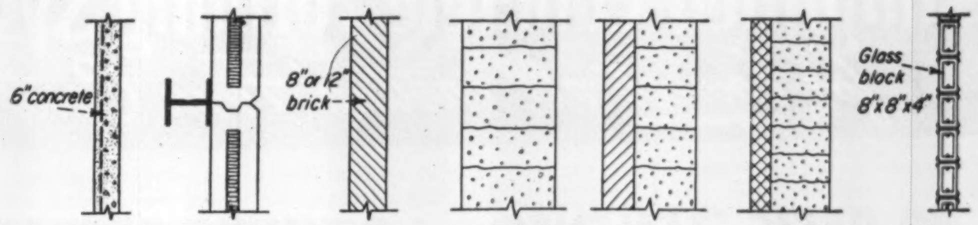
Steel Erectors:
American Bridge

USS

UNITED STATES STEEL

Wall construction costs and prices roundup

Masonry walls

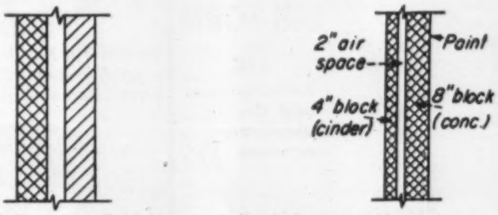


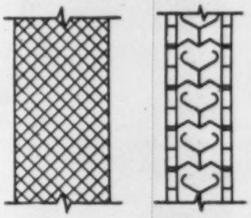
Material	Concrete		Precast conc. sandwich	Brick		Concrete block		Brick & block	Tile & block	Glass block
	Tilt up	Cip								
Thickness	†6"	8"	5"	8"	12"	8"	12"	12"	10"	4"
Cost, $/sq ft*	1.00	2.70	2.60	2.63	3.26	0.72	0.91	1.64	1.79	3.23[S]
"U" factor†	0.79	0.70	0.14	0.50	0.36	0.56	0.49	0.44	0.36	0.56

* for unfinished walls. Data by Ford, Bacon & Davis, Inc., Engineers, except as noted. Add $0.33/sq ft for metal lath & ¾" plaster furred. [S] Seelye Stevenson Value & Knecht, Consulting Engineers. † Coefficient of heat transmission, air to air, outside wall.

Masonry cavity walls

Hollow tile walls



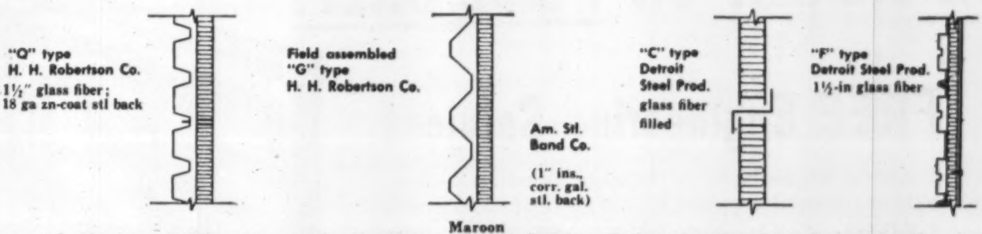


Material	Brick	Brick & t. c. tile	Brick & ungl. tile	Brick & gl. tile	Cinder & conc. block	Hollow tile		NATCO, unglazed	
Thickness	10"	10"	10"	10"	14"	8"	10"	8"	12"
Cost, $/sq ft*	2.74	2.08	2.39	2.61	1.75[a]	1.10	1.54	2.40	3.15
"U" factor†	0.30	0.29	0.29	0.29	0.27	0.40	0.30	0.36	0.26

* for unfinished walls. Data by Ford, Bacon & Davis, Inc., Engineers, except as noted. Add $0.33/sq ft for metal lath & ¾" plaster furred. [S] Seelye Stevenson Value & Knecht, Consulting Engineers. † Coefficient of heat transmission, air to air, outside wall.

Prefabricated exterior wall panels

Insulated metal wall panels


"Q" type
H. H. Robertson Co.
1½" glass fiber; 18 ga zn-coat stl back
Field assembled "G" type
H. H. Robertson Co.
Am. Stl. Band Co.
(1" ins., corr. gal. stl. back)
"C" type Detroit Steel Prod. glass fiber filled
"F" type Detroit Steel Prod. 1½-in glass fiber

Surface	20 ga steel, zn coated	Aluminum 16 ga BS	Stainless stl, 20 ga	20 ga steel, zn coated	Aluminum 16 ga BS	Maroon galbestos "V" beam	Stainless stl 26 ga	Carb steel, 2 sides	Alum face, gal stl back	Carb steel, two sides	Alum face, gal stl back
Price fob plant* $/sq ft	1.70*	2.10*	3.10*	1.50*	1.90*	1.40*	...	1.20**	1.65**	1.20‡	1.50‡
Cost, erected $/sq ft	...	2.90[F]	...	...	...	1.75[F]	2.20–2.40	...	2.55[F]	2.35[Sa]	2.55[S]
"U" factor†	0.18	0.16	0.17	0.18	0.16	0.16	...	0.20	0.20	0.13	0.13

• *fob plant, Ambridge, Pa; based on quantities of approx 3000 sq ft or more • ** fob plant, Baltimore, Md • ‡ fob plant, Pittsburgh, Pa • [F] Ford, Bacon & Davis, Inc., Engineers, New York NY • [S] Seelye Stevenson Value & Knecht, Consulting Engineers, New York, NY
[a] incl paint

These tables show erection costs of masonry-type walls and factory prices as well as some costs in place for prefabricated and field assembled panel walls. Although there is little standardization in the panel wall field, the prices in the tables cover the most common types of panels being erected today. In using these prices, the reader should remember that panel wall costs vary with the amount of fabrication required for a specific job—the number of windows, special cutting.

To help round out the picture in the tables, here are panel costs for some buildings recently constructed:

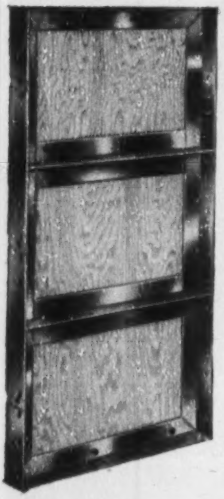
General Bronze Corp, Garden City, N. Y., fabricated and erected 676 aluminum panels last June to enclose an office building at 460 Park Av., New York City (ENR July 1, 1954, p. 23). Total cost of erected panels was $6.50 per sq ft, including 0.11-in. aluminum panels, ½-in. glass fiber insulation, 4-in. cinder-concrete block backup and windows, unglazed. Panels were 23 ft high by 4½ ft wide, with two 6-ft-high windows.

(Continued on page 215)

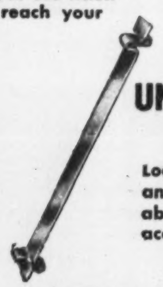
Simplified Concrete Forming System

*for **Lowest** all around Form Costs!*

3 BASIC ELEMENTS



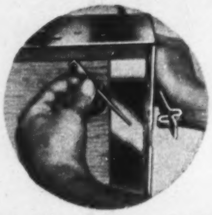
UNI-FORM Panels
Prefabricated . . . ready to use when they reach your job.



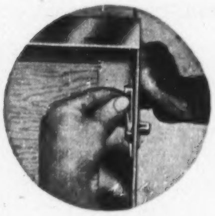
UNI-FORM Tie
Locks, spreads and ties . . . absolutely accurate.

UNI-FORM Tie Key
Wedge-Shaped for fast, easy insertion.

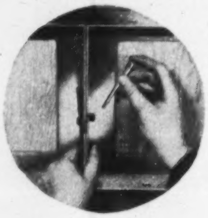
3 SIMPLE OPERATIONS



1 Place the Uni-Form Tie Loop into the Tie Hole.



2 Set the Tie Key into the Tie Loop. Panel and Tie are then locked into one integral unit.



3 Bring the next UNI-FORM Panel into position . . . insert the Tie Key. The assembly is now completed.

UNI-FORM® Panels Assure Faster Erection . . . Automatic Accuracy

ALIGNMENT ON 1 SIDE ONLY!

NO ALIGNMENT REQUIRED ON THIS SIDE!

FREE Engineering Service!

Complete job analysis . . . forming recommendations, bills of material supplied by our staff of experienced engineers . . . **PLUS** . . . Field Service . . . anywhere . . . anytime to insure proper starts and maximum economy on your job. Send us a set of plans for FREE estimate. No obligation.

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. . . Wall costs and prices roundup

Similar panels were fabricated and erected in August '53 for an office building at 99 Park Av., New York City (ENR Aug. 13, 1953, p. 43). They cost $7.25 per sq ft in place, including 0.1-in.-thick aluminum sheets backed up by a 1½-in. air space, 4-in. brick, 2-in. rigid glass fiber insulation and a plaster inside wall finish.

Wolverine Porcelain-Enamel Co., Detroit, Mich., prefabricated insulated metal panels with porcelain-enamel on both faces for buildings at the General Motors Technical Center. Panels are 2-2½-in.-thick with a resin-impregnated paper honey comb core which is filled with perlite and sandwiched between two sheets of 16 or 18 gauge steel. The honey comb is affixed to asbestos sheeting which is bonded to the steel faces.

A 2-in.-thick double-faced panel costs about $3.50 per sq ft, fob factory, and has a "U" value of .276. A single-faced panel (porcelain enamel on one side and painted steel on the other) costs about $3.00 per sq ft, fob factory.

Erection costs, including staging and scaffolding, add $0.75 to $1.00 per sq ft.

Seaporcel Metals, Inc., Long Is. City, N. Y., prefabricated 1640 porcelain-enamel panels used June '54 for the Statler Hotel, Hartford, Conn. (ENR June 10, 1954, p. 31). Cost of the panels erected was $5.00 per sq ft, including 20 gauge porcelain-enameled steel exterior face, 1-in. glass fiber insulation, aluminum vapor seal and ⅛-in. asbestos cement inside face (this was painted and became the inside wall surface).

Cupples Products Corp., St. Louis, Mo., fabricated and erected aluminum spandrel panels and window sash for a 26-story office building at 112 W. 34 St., New York City, in June 1954. Cost of the panels installed was less than $4.00 per sq ft, excluding glass and glazing (ENR June 17, 1954, p. 23).

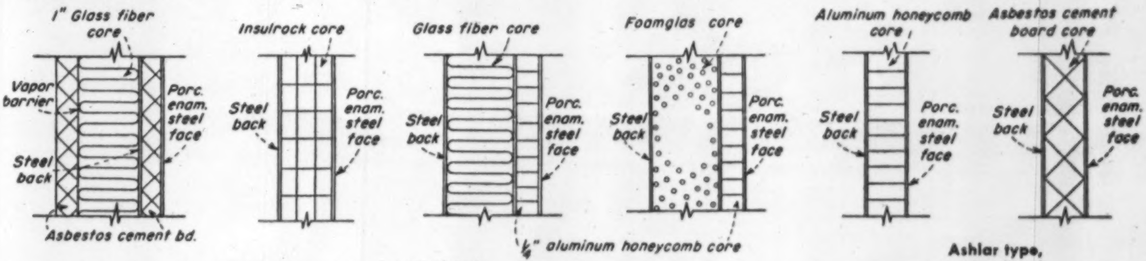
The ⅛-in.-thick aluminum panels were coated on the back with ⅛-in.-thick inorganic acoustical material and backed up with 4-in. concrete block with a 5-in. air space between panel and backup. Panels measured 5'9" by 4'6".

R. C. Mahon Co., Detroit, Mich., makes several types of insulated metal wall panels (not shown in tables). They come in two thicknesses, each insulated with 1½-in. of Fiberglas. The 1 9/16-in.-thick flush-surface panel with 20 gauge galvanized steel on both faces is priced at $1.15 per sq ft, fob factory, Detroit, and has a "U" factor of .40. With one face of aluminum or enamel-coated steel, this panel costs $1.61 and $1.18, respectively, per sq ft.

The 3½-in.-thick fluted-surface panel with both sides of 18 gauge galvanized steel costs $1.25 per sq ft, fob factory, and has a "U" factor of .15. With one face aluminum, the price is $1.60 or with one face enamel-coated steel, it's $1.20 per sq ft. All prices are based on 10,000 sq ft or more.

Prefabricated exterior wall panels

Porcelain enamel steel face, coated steel back — Seaporcel Metals, Inc.

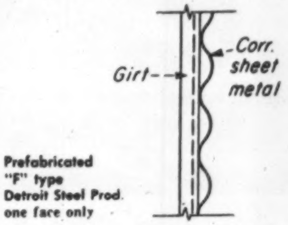


1" Glass fiber core
Vapor barrier
Steel back
Porc. enam. steel face
Asbestos cement bd.
Insulrock core
Steel back
Porc. enam. steel face
Glass fiber core
Steel back
Porc. enam. steel face
Foamglas core
Steel back
Porc. enam. steel face
¼" aluminum honeycomb core
Aluminum honeycomb core
Steel back
Porc. enam. steel face
Asbestos cement board core
Steel back
Porc. enam. steel face

	Insulated								Ashlar type, not insulated				
Core material	Glass fiber	Insulrock			Glass fiber		Foamglas		Aluminum honey comb			Asbestos cem. bd.	
Core thick	1"	⅞"	1⅜"	1⅞"	1"	1½"	1½"	2"	¼"	½"	¾"	⅛"	¼"
Price, fob plant* $/sq ft	2.70	2.00	2.30	2.39	3.00	3.10	3.15	3.35	2.17	2.44	2.62	1.90	2.09
"U" factor†	0.20	0.35	0.25	0.19	0.20	0.15	0.21	0.16	...	...	...	...	...

* fob plant, Long Island City, N. Y. † Coefficient of heat transmission, air to air, outside wall.

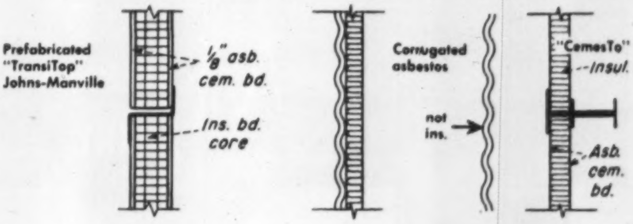
Metal wall panels, not insulated



Girt
Corr. sheet metal
Prefabricated "F" type Detroit Steel Prod. one face only

Surface	Carbon Steel	Aluminum	Galv. Steel
Price, fob plant* $/sq ft	0.30	0.58	...
Cost, erected $/sq ft	...	...	0.95[S]
"U" factor†	...	...	1.30

Asbestos cement insulated wall panels



Prefabricated "TransiTop" Johns-Manville
⅛" asb. cem. bd.
Ins. bd. core
Corrugated asbestos
not ins.
"CemesTo"
Insul.
Asb. cem. bd.

Core thickness	7/16"	⅞"	1 5/16"	1¾"	1"	1½"	2"	...	1½"	2"
Price, fob plant** $/sq ft	0.26	0.32	0.38	0.44	...	...	...	...	...	...
Cost, erected $/sq ft	...	...	...	...	1.40[F]	1.55[F]	1.70[F]	0.75[F]	0.75	0.90
"U" factor	0.47	0.29	0.21	0.17	0.26	0.20	0.16	1.16	0.20	0.16

*fob plant, Pittsburgh, Pa. **fob plant, Billerica, Mass.; based on 5 tons or more [F] for unfinished walls. Data by Ford, Bacon & Davis, Inc., Engineers, except as noted. Add $0.33/sq ft for metal lath & ¾" plaster furred. †coefficient of heat transmission, air to air, outside wall

The contractors knew they would have to contend with strong winds and heavy seas during the building of a bridge across Tampa Bay on the west coast of Florida. The complete pile driving job for the bridge required a total linear length of more than 14 miles of piling.

Sure enough, a violent storm developed during the operations. However, through the contractor's skill and efforts, the pile-driving operations were completely successful, using a McKiernan-Terry No. 9-B-3 Double-Acting Hammer for cofferdam sheeting and McKiernan-Terry No. 10-B-3 and 11-B-3 Hammers rigged for under-water operation to drive the pier foundation piles.

You, too, can securely depend on McKiernan-Terry Hammers for *your* pile driving operations, no matter what the conditions and requirements may be. Write for catalog describing the complete McKiernan-Terry line of 16 types and sizes of Double-Acting Pile Hammers and Extractors and Single-Acting Pile Hammers

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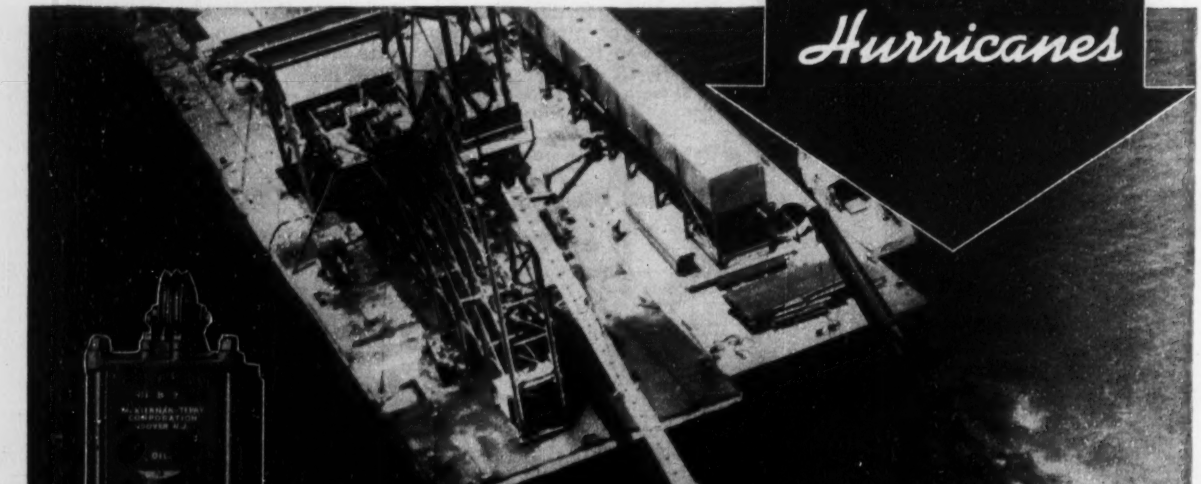


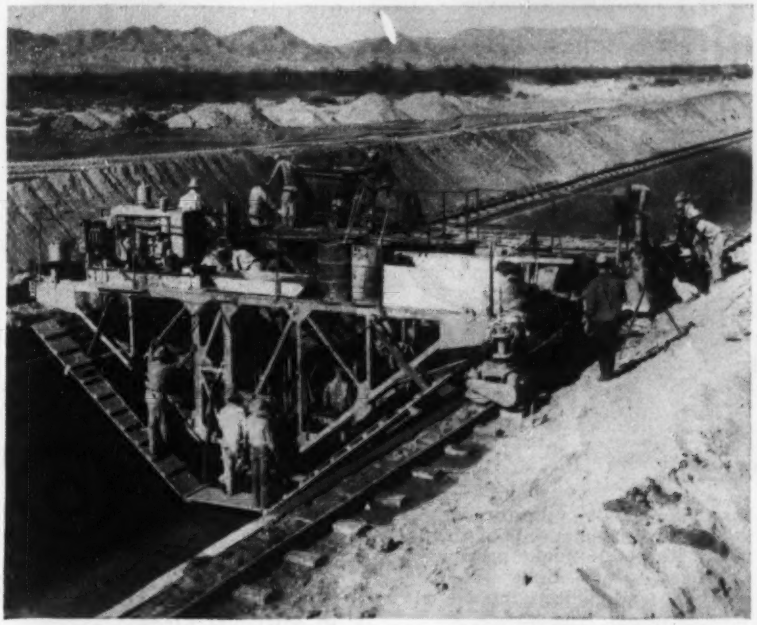
McKIERNAN TERRY

One of the reinforced cofferdams of the Tampa Bay Bridge piers for which cofferdam sheeting and foundation piles were driven by McKiernan-Terry Hammers. Parsons, Brinckerhoff, Hall & MacDonald, Consulting Engineers; Hardaway Contracting Co., Contractors.

McKIERNAN-TERRY CORPORATION, Manufacturing Engineers
Also Manufacturers of Coal and Ore Unloaders and Bridges, Grab Buckets, and Special Machinery
13 PARK ROW, NEW YORK 38, N. Y. ● PLANTS AT HARRISON, N. J. AND DOVER, N. J.

MK343

Unit Prices Bid by Contractors



LINING MACHINE AND FINISHING JUMBO in operation on the Gila Project irrigation system, Arizona.

Earthwork

Irrigation distribution system, Arizona

Morrison-Knudsen Co., Inc., Los Angeles, Calif., (and Boise, Idaho) placed low at $1,169,000 on Unit 2 of the Wellton-Mohawk Division, Gila Project, in bids opened July 13 by the Bureau of Reclamation at Yuma, Arizona. Start of work awaits completion in October of Unit 1.

Low bid is 11% and $141,487 under the engineer's estimate. It is 4% and $45,140 under second bid, and only 11% under the fourth and high.

This work includes 26 miles of nonreinforced concrete-lined laterals; earthwork for Wellton-Mohawk Canal, overchute channel, wasteway and flood channel; concrete siphons, culverts, turnouts, checks, drops, chute, stilling pool, lateral turnouts and deliveries for the Wellton Distribution System.

Concrete prices turned the trick. The Morrison-Knudsen bid is $51,000 or 12% under second bidder on three concrete items--more than enough margin to clinch the contract.

The contractor must supply all materials. He has until October, 1955, to finish work.

A railroad traverses the job site; highway transportation is available too.

Skilled labor in the area receives minimum of $2.80 per hour, semiskilled $1.925.

Special equipment to be used includes ditching and trimming machines, spraying jumbo, lining machine and finishing jumbo.

Bidders include:

1C	Morrison-Knudsen Co., Inc., Los Angeles	$1,168,977
2	Marshall and Haas, Belmont, Calif	1,214,117
4	Bentson Contg. Co., Inc., Phoenix, Ariz	1,266,378
EE	Bureau of Reclamation, Yuma, Ariz.	1,310,464

Bids: 7-13-54 Item	Unit	Quantity	Unit Prices 1 C	2
Exc, laterals	cy	437,300	$0.327	$0.30
channels & dikes	cy	404,000	0.20	0.18
structures	cy	23,000	0.60	1.10
Overhaul	micy	1,500	2.00	1.00
Compact embankments	cy	205,000	0.50	0.425
backfill, struct.	cy	8,350	2.40	3.00
Backfill, struct.	cy	19,850	0.56	0.50
Riprap	cy	4,500	4.70	4.50
gravel bed for	cy	1,100	3.60	4.50
Trim earth fndn, conc lining	sy	200,000	0.31	0.35
Conc, structures	cy	1,710	102.50	110.00
unreinf conc latl lining 2"	cy	10,920	16.50	20.00
2½"	cy	215	21.75	20.00
Cement, furn & handle	bbl	19,300	5.35	5.50
Rem & repl 48"ϕSSCCP	lf	16	6.00	9.00
asph surface	sy	410	0.24	2.00
conc, exist struc	cy	26	24.00	15.00
Furnish and place:				
Gravel road surf	cy	300	3.60	4.00
Reinf bars	lb	119,840	0.21	0.19
Elastic fill matl, jt, ½"	sf	29	1.20	5.00
1"	sf	810	1.80	5.00
Untreat timber, struct	Mfbm	4.5	302.00	400.00
Vert conc irr pipe, 12"	lf	16	2.40	2.25
ES casg P w rubber gask jt & HC50 conc pres P				
36"	lf	264	89.00	100.00
42"	lf	64	94.50	125.00
SSRCCP 18"	lf	85	6.75	5.75
24"	lf	100	7.40	8.80
30"	lf	4,250	10.65	9.25
36"	lf	415	13.00	12.00
42"	lf	995	16.50	14.50
48"	lf	330	19.30	17.00
54"	lf	170	25.00	18.50
Conc pres P, rubbr gask jt, HC 50 24"	lf	44	8.10	9.50
30"	lf	200	9.90	11.00
36"	lf	1,660	12.00	14.25
42"	lf	440	15.90	18.00
HE50 30"	lf	52	13.40	14.00
36"	lf	52	17.30	19.00
42"	lf	52	21.25	22.00
Asphalt surface	sy	410	7.25	4.00
Misc metalwork	lb	5,690	0.61	0.60
Met slide gates & hoist.	lb	77,175	0.67	0.65
Radial gate & hoist	lb	1,350	1.35	1.30
Place:				
Rubbr waterstops, jts. 4½"	lf	1,484	1.80	2.50
6"	lf	15	2.50	2.50
Met slide gates & hoist.	ea	7	121.00	75.00
Fabricate:				
Bends in conc pipe 24"ϕ	ea	2	42.35	60.00
30"	ea	127	52.00	80.00
36"	ea	12	60.50	95.00
42"	ea	34	78.00	120.00
48"	ea	6	103.00	135.00
	ea	2	127.00	150.00

Richville Dam, Vermont

O. W. Miller Co. of Ludlow, Mass., will build the $24,150 Richville Dam on Lemon Fair River in East Shoreham, Vermont, 7% and $1,862 under second bid. Haley & Ward, Boston engineers, designed the structure for the Vermont State Fish & Game Service. Of concrete, it will be 92 feet long, 13 feet high.

Concrete masonry prices swung the bid, with Miller $2,550 under second.

The job must be completed within 125 working days.

Highway transportation is near the site; railhead is five miles distant. All materials are furnished by the contractor.

Bidders include:

1C	O. W. Miller Co., Ludlow, Mass.	$24,150
2	Earle & Merry Inc., Rutland, Vt.	26,012
5	Will P. Horrigan, Swanton, Vt.	40,612

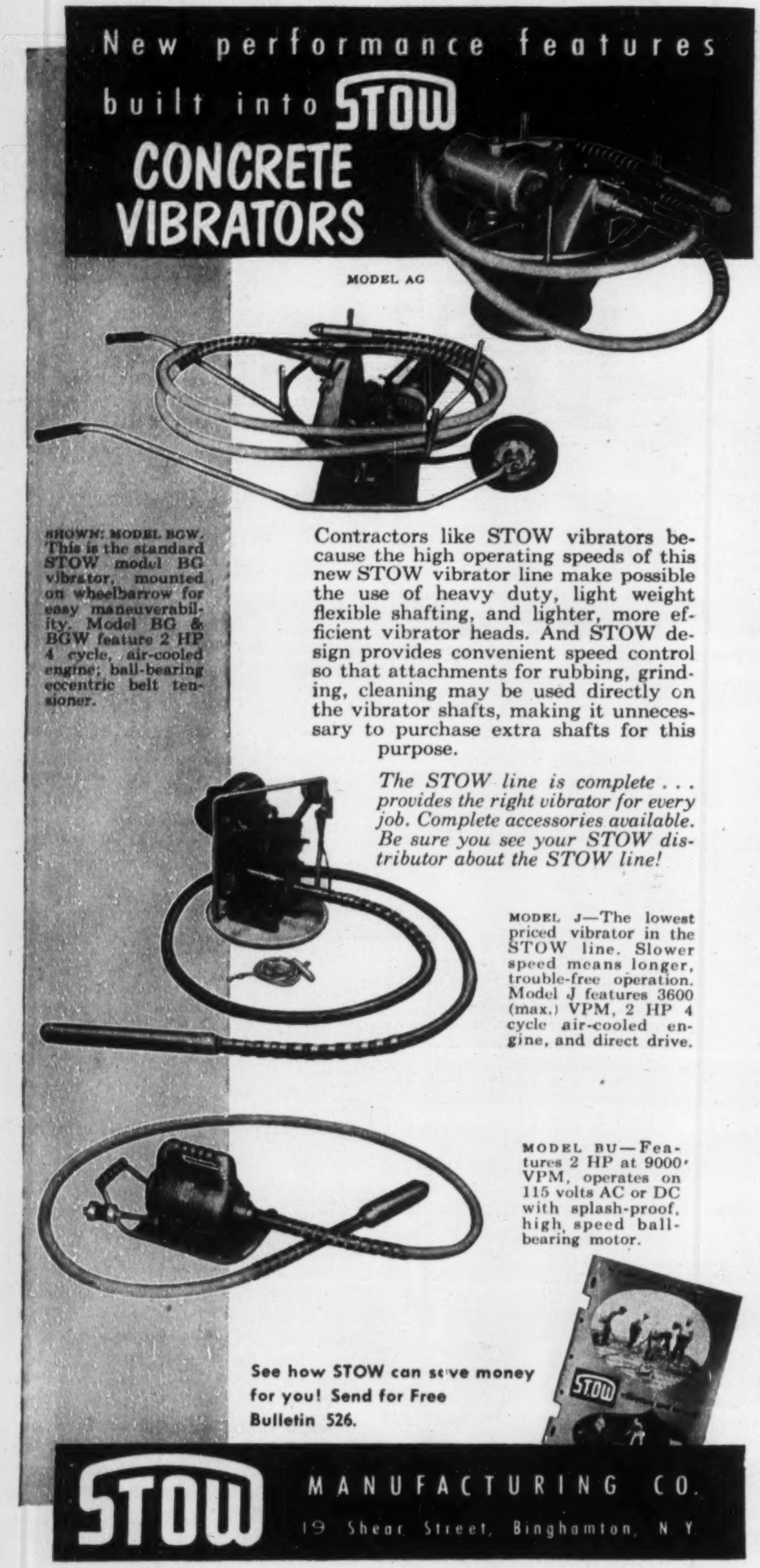
Bids: 7-2-54 Item	Unit	Quantity	Unit Prices 1C	2
Clearing site	ls	1	$700.00	$1,000
Exc, earth	cy	100	1.00	2.50
rock	cy	150	1.20	1.00
Conc masonry	cy	510	35.00	40.00
Steel reinf	ton	1.5	600.00	500.00
24" sluice gate	ls	1	1,000	1,250
Misc work	ls	1	1,500	600.00
Screened gravel	cy	25	25.00	50.00
Riprap paving	cy	25	8.00	2.50

Florida canal and levee

The U. S. Corps of Engineers at Jacksonville awarded canal and levee No. 12 of the Central and Southern Florida Flood Control Project at $927,030 to Robert E. Lee & Co., Inc. of Manning, S. C. The job went for 20% less than the engineer's $1,162,160 estimate, 10% under second bid.

Work consists of constructing 10.5 miles of canal and adjacent levee embankment along the alignment of Lake Okeechobee's West Palm Beach Canal, including installation of six culverts at tributary canals, and riprap at a bridge crossing.

Continued on following page



New performance features built into STOW

CONCRETE VIBRATORS

MODEL AG

SHOWN: MODEL BGW. This is the standard STOW model BG vibrator, mounted on wheelbarrow for easy maneuverability. Model BG & BGW feature 2 HP 4 cycle, air-cooled engine; ball-bearing eccentric belt tensioner.

Contractors like STOW vibrators because the high operating speeds of this new STOW vibrator line make possible the use of heavy duty, light weight flexible shafting, and lighter, more efficient vibrator heads. And STOW design provides convenient speed control so that attachments for rubbing, grinding, cleaning may be used directly on the vibrator shafts, making it unnecessary to purchase extra shafts for this purpose.

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MODEL J—The lowest priced vibrator in the STOW line. Slower speed means longer, trouble-free operation. Model J features 3600 (max.) VPM, 2 HP 4 cycle air-cooled engine, and direct drive.

MODEL BU—Features 2 HP at 9000 VPM, operates on 115 volts AC or DC with splash-proof, high speed ball-bearing motor.

See how STOW can save money for you! Send for Free Bulletin 526.

STOW MANUFACTURING CO.
19 Shear Street, Binghamton, N. Y.

Florida canal and levee

Continued from preceding page

This contract is for first stage construction, with canal bottom width ranging from 20 to 40 feet.

Lee Co. came out $108,700 ahead of second bidder despite higher culvert prices.

The contractor has 730 days before September 1956 to finish work. Liquidated damages are $50 per day.

Bidders include:

1C	Robert E. Lee & Co., Inc., Manning, S. C.	$927,030
2	Swan Constr. Co., Cincinnati, Ohio	1,035,742
3	Arundel Corp., Baltimore, Md.	1,468,553
EE	U. S. Corps of Engineers, Jacksonville, Fla.	1,162,160

Bids: 7-16-54 Item	Unit	Quantity	Unit Prices 1C	 2
Exc, uncl	cy	2,098,000	$0.385	$0.475
Pipe culvert;				
4-bbl, 72"ϕ, no. 1	lf	76	230.26	96.76
2-bbl, 66"ϕ, no. 2	lf	74	121.62	44.24
3-bbl, 72"ϕ, no. 3	lf	76	184.21	72.57
4	lf	78	185.90	72.43
4-bbl, 72"ϕ, no. 5	lf	78	243.59	96.58
5-bbl, 72"ϕ, no. 6	lf	78	269.23	120.72
Stone protection	sy	1,350	18.00	0.333

Pile dikes & revetments in Missouri River

Low bid on construction and repair of about 17,730 linear feet of pile dikes and revetment repair at bends in the Missouri River near Glasgow, Mo., was submitted by Massman Construction Co., Kansas City, Mo., at $300,510, 15% less than estimated.

Five of eight bids sent to the Kansas City District Corps of Engineers were under the estimate; unit prices by the three lowest bidders were lower than the engineer's estimate in every instance. The Massman bid was 5% under second low.

Work must be completed within 240 calendar days. Liquidated damages are $25 per day.

Carpenters will receive a minimum of $2.15-$2.25 per hour, dragline operators and pile drivers $2.675, dumptruck drivers $1.67, bulldozer operators $2.325, unskilled labor $1.475-$1.60. Work site is 4.6 miles from the Glasgow railhead.

Bidders include:

1	Massman Constr. Co., Kansas City, Mo	$300,510
2	Pine Bluff Sand & Gravel Co., Pine Bluff, Ark.	315,500
3	Mo-Kaw Constr. Co., Kansas City, Mo	420,585
EE	U. S. Corps of Engineers, Kansas City 8, Mo. (hired labor estimate)	354,721

Bids: 8-3-54 Item	Unit	Quantity	Unit Prices 1	 2
Pile Dike & Dike Repair				
Quarry-run stone in:				
trench fill	ton	500	$2.10	$2.40
paving	ton	1,100	2.00	2.40
pile dikes	ton	55,600	1.55	1.72
by dragline	ton	7,700	1.67	1.92
Piles	lf	84,500	1.17	1.10
Grading	cy	5,800	0.40	0.35
Revetment Repair				
Piles	lf	10,200	1.17	1.10
Quarry-run stone in:				
pile revet	ton	45,100	1.55	1.72
by dragline	ton	9,100	1.67	1.92

9:40 AM — A Caterpillar D-7 is ready for its daily grease job and maintenance check. Hoses reach from the Portable Service Station. Fresh, clean lubricant is applied with finger-tip control. Time: 12 minutes.

9:53 AM — This LeTourneau Carry-All is serviced fast. Major bearings, vital lubrication points, all serviced and ready to go in just 7 minutes. With NO time lost in traveling to and from a central grease shop!

10:01 AM — The operator is seen filling crankcase to proper level on this Motor Grader. Meter shows exact amount of oil pumped—no waste. This equipment is greased and checked in only 22 minutes!

Beat "impossible" time schedules,

lick the toughest lubrication maintenance problems!

Triangle Construction depends on Alemite "on-the-go" lubrication to protect vital rigs!

Faced with the problem of meeting almost impossible schedules on job after job involving heavy earthmoving equipment, the Triangle Construction Company of Kankakee, Illinois, consulted their Alemite suppliers, the General Equipment Company. On their recommendation this Alemite Portable Service Station was assembled.

Standard Alemite equipment was mounted on a 2½-ton truck. Thus, the service station went right to the equipment. Results were immediate and impressive! First saving was in time. Rigs paused only momentarily for service and routine maintenance, and time waste in going to and from the grease shop was completely eliminated.

Even more important was the saving in equipment downtime which became apparent with proper, regular lubrication-protection. There was less machine wear and maintenance costs dropped sharply.

Your Alemite representative can "tailor" a portable service station to exactly fit your needs. Show you how you too can save these three ways!

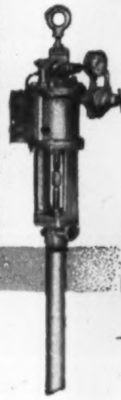
1. Save Time! By bringing complete power lubrication right to the equipment on the job — safely, efficiently!

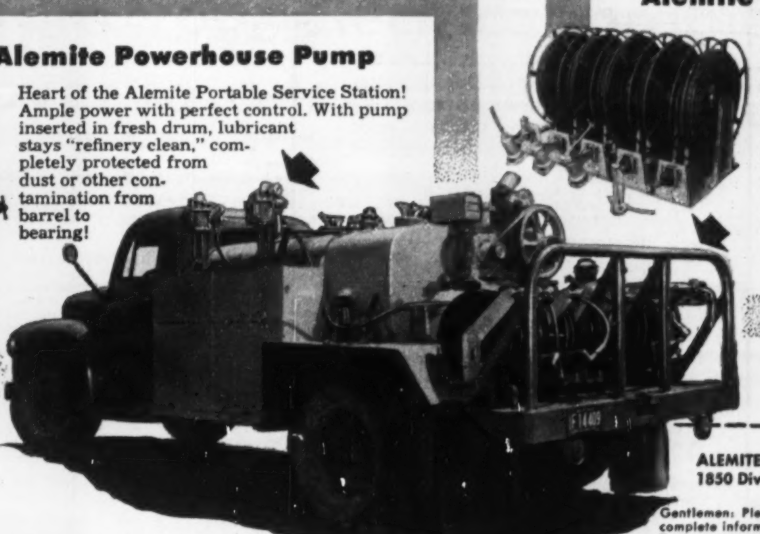
2. Save Money! By cutting expensive lubrication downtime — increasing output of both men and machines!

3. Save Equipment! By greatly reducing the possibility of costly, time-consuming bearing failure and excessive wear!

The Alemite Powerhouse Pump

Heart of the Alemite Portable Service Station! Ample power with perfect control. With pump inserted in fresh drum, lubricant stays "refinery clean," completely protected from dust or other contamination from barrel to bearing!

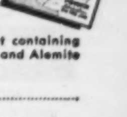




Alemite Automatic Hose Reels

Mounted directly on the truck bed, these hose reels allow the operator 40′ of hose, provide positive delivery. No tension while applying lubrication, yet hose automatically retracts when finished. Keeps hose off the ground, out of the way. Manual models also available. Reels offer these 4 services:

1. Fast, easy greasing of track rolls, fittings.
2. Quick filling of gear housings, transmissions, final drives.
3. Delivers exact amount of crankcase oil needed—no waste.
4. Air line for inflating tires or air cleaning.



ALEMITE, Dept. W-104
1850 Diversey Parkway, Chicago 14, Illinois

Gentlemen: Please send me your FREE illustrated booklet containing complete information on Alemite Portable Service Stations and Alemite Equipment.

Name..

Company..

Address..

City.................................State..............

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STEWART WARNER

Turnpike CONTRACTORS CHOOSE McCARTHY AUGER DRILLS

● Where the going is tough — on the Pennsylvania Turnpike, New York Thruway, West Virginia Turnpike and elsewhere — contractors choose rugged, powerful McCarthy Drills.

On the Ohio Turnpike, near Windham, this McCarthy Vertical Auger Drill drills 6-inch blast holes to a depth of 18 feet at the rate of 22 holes in 8 hours.

Operators like the great new McCarthy. It is rugged, mobile and dependable. In any earth or rock formation consisting of compacted sand and gravel, hardpan, shale, and most sandstone formations, the McCarthy is faster than any other.

Easy-to-move, easy-to-set-up McCarthy Verticals operate on gasoline, diesel or electrical power units. They require only a two-man crew.

Get the facts about the McCarthy—"choice of the turnpike contractors"—and see for yourself how faster drilling and dependable performance combine to give you bigger profits.

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SINCE 1901

THE SALEM TOOL CO.

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FORT EUSTIS, VA., HELIPORT has 600-ft diameter.

Airports

Heliport at Virginia army base

On the helicopter airport, now almost complete at Fort Eustis, Va., McKoy-Helgerson Co. of Greenville, S. C., was low at $963,712 just 0.6% under second bid, 0.8% under third, and 8% less than $1,049,547 estimate by U. S. Corps of Engineers.

This heliport will have two crossing asphalt runways 600 feet long, with a 30-ft circular taxiway and eight stub taxiways to landing positions and parking aprons. Also included in the project are: hangar building 240 by 43 feet; administration building 43 feet wide by 100 feet long and housing the control tower; and warehouse 50 feet wide, 180 feet long. Across the front of the buildings is a 750-ft asphalt ramp to be used as a helicopter parking area.

Each of 14 contractors bid on flexible and concrete pavement alternates. The $987,175 concrete pavement low bid was 2% above contract price, placed sixth low of 28 bids received.

Work started Oct. 11, 1953. Completion date is Nov. 15, 1954.

Rail, highway and water transportation are immediately available.

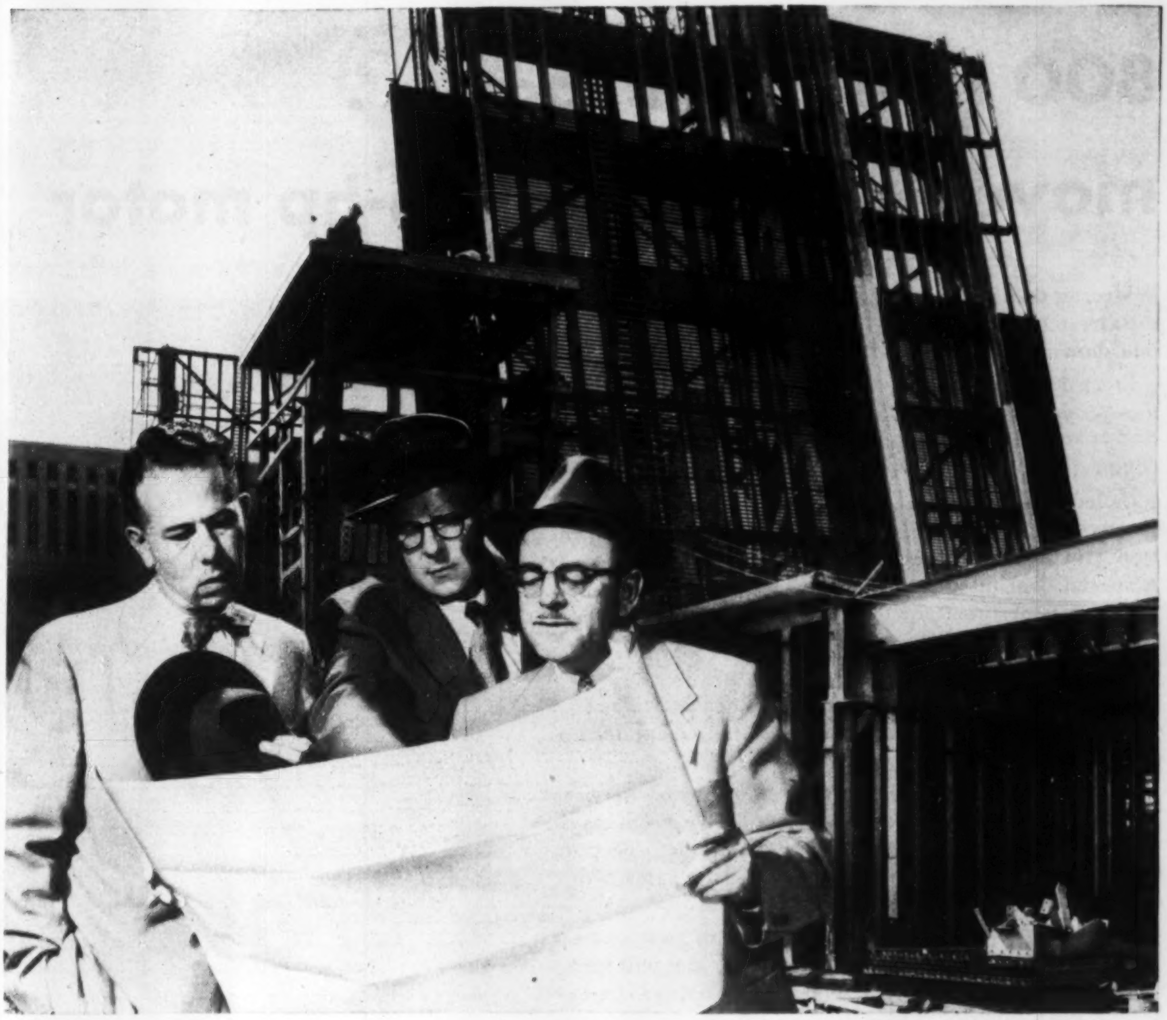
Minimum wage rates in 1953 at Norfolk allow $2.15 per hour to carpenters, $2.65 to electricians, $2.20 to painters, $2.925 to plasterers, $2.625 to plumbers, and $1.15 to laborers.

Bidders include:

1C	McKoy-Helgerson Co., Greenville, S. C	$963,712
2	Virginia Eng. Co., Inc., Newport News, Va.	970,000
14	Algernon Blair Inc., Montgomery, Ala	1,153,176
EE	U. S. Corps of Engineers, Norfolk, Va	1,049,547

Bids: 9-24-53 Item	Unit	Quantity	Unit Prices 1 C	2
Warehouse, bldg	ls	1	$41,800	$42,000
sprinkle sys	ls	1	4,200	4,600
elec work	ls	1	3,500	3,600
heat & vent	ls	1	3,150	2,600
Shops & hanger bldg	ls	1	296,000	300,840
elec	ls	1	36,200	38,000
plumbing	ls	1	18,300	42,000
ht & vent	ls	1	40,600	18,000
Admin bldg w contrl towr.				
bldg	ls	1	$76,000	$68,000
elec	ls	1	19,000	20,000
plumbing	ls	1	5,200	5,000
ht, vent & air cond	ls	1	14,800	15,000
Clear & grub	ac	60	600.00	730.00
Exc—pvmt, conc*	cy	24,300	0.50*	0.45*
flexible	cy	25,200	0.50	0.45
Borrow—pvmt, conc*	cy	47,000	0.55*	0.36*
flex	cy	41,100	0.55	0.36
Conc pvmt 6"*	sy	45,600	3.75*	4.[illegible]
sidewalk 4"	sy	720	3.55	[illegible]
Flex pvmt;				
blend grav base crse	sy	46,300	2.00	1.68
bit prime coat	gal	16,200	0.216	0.30
macadam wear crse	ton	7,100	5.30	6.00
materials	gal	109,000	0.12	0.15
Tiedown anchr—conc pvmt*	ea	98	2.10*	2.50*
flex pvmt	ea	98	7.60	8.00
Asph shoulder treatment	gal	5,600	0.25	0.20
Seeding	ac	15	360.00	350.00
Water distrib system:				
Conn to exist 14" mn incl vlv & fitg	ls	1	1,600	1,500
Cl water mn w fitg, 12"	lf	9,000	5.55	6.15
10"	lf	584	4.85	5.00
8"	lf	666	3.90	4.00
6"	lf	1,190	3.25	3.20
4"	lf	30	4.00	2.30
Galv water main 2½"	lf	127	2.00	3.00
Gate vlv & box 12"	ea	1	215.00	240.00
8"	ea	1	150.00	130.00
6"	ea	3	105.00	90.00
4"	ea	1	85.00	60.00
2½"	ea	1	65.00	50.00
Post indic vlv 6"	ea	1	190.00	155.00
Fire hydrants	ea	6	205.00	205.00
Three 2-pile bents, compl	ls	1	350.00	610.00
Sand or grav fill	cy	30	5.00	7.50
Drainage:				
Sew pipe 8"	lf	638	2.30	2.50
6"	lf	1,041	1.60	2.00
CIP sew 6"	lf	59	3.50	4.00
Cl sew force main 4"	lf	492	2.50	2.50
Manhole	ea	4	280.00	210.00
Cleanout	ea	1	90.00	48.00
5,000 gal septic tank	ls	1	1,950	2,600
Sump pump & sheltr compl	ls	1	1,850	2,400
Filt bd, incl distrib box excl 8" drain line	ls	1	6,350	16,000
RCP 36"	lf	345	16.00	12.00
30"	lf	225	11.40	9.00
24"	lf	1,213	5.80	7.00
18"	lf	1,000	3.80	5.00
15"	lf	313	3.60	7.00
12"	lf	107	4.40	4.00
Downspout drains 8"	lf	260	1.60	2.50
Grease trap w storm MH conn, compl	ea	1	215.00	280.00
Inlet A	ea	3	220.00	195.00
B	ea	7	410.00	410.00
C	ea	3	225.00	175.00
Manhole	ea	3	235.00	160.00
Headwall	ea	4	88.00	185.00
Heliport lighting	ls	1	37,500	38,600
Elec distrib system	ls	1	14,000	13,400
Steam distrib sys;				
1" return, line 5"	lf	240	24.80	20.00
4"	lf	95	21.20	24.00
(warehouse) 4"	lf	193	8.70	7.00
Railroad crossing	ls	1	540.00	275.00
Heliport marking	ls	1	1,250	900.00
Tpsoil, 4" set thickness	cy	8,000	0.95	0.275

* Concrete pavement alternate not chosen



Turn your electrical problems over to a team like this . . .

Teams like this represent a special, yet typical, Westinghouse service—readily available to the construction industry.

Assignment of these teams: to help you obtain the most up-to-date electrical system available. And in scope, this can range from a motor drive problem on a movable traffic bridge to one involving a complete electrical distribution system in an industrial plant.

These teams are made up of Westinghouse engineering and application specialists. In your office or at the job site, they help you select, coordinate and apply full lines of Westinghouse apparatus. And they work closely with you—from design stages through final construction.

Check the next two pages. There you'll see a specific example of how Westinghouse teams are serving people like you in the construction industry. J-94026

⟶

YOU CAN BE **SURE**... IF IT'S

Westinghouse

800 tons of lift span . . .
moved by a single 135-hp motor

Widening the Cuyahoga River at the Cleveland entrance to the Great Lakes has necessitated 15 new bridges like the one shown here.

Erected for the New York Central Railroad, it has a 250-foot lift span—double the length of the bridge it replaced. And span weight has also increased materially, along with engineering problems.

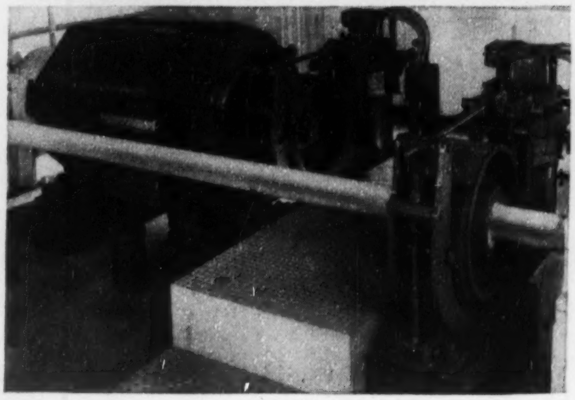
Called into the project early, a Westinghouse team worked closely with the consulting engineers, in Kansas City, and later with the general and electrical contractors of Cleveland. A special control system—devised by the consulting engineers—was designed for tower drive operation. It utilizes weight counterbalances so precisely that one 135-hp, 230-volt d-c Westinghouse motor moves the 800-ton span.

The same Westinghouse team coordinated delivery of 12 different product groups and offered specialized application assistance when needed.

This is another instance of the coordinated services Westinghouse offers the construction industry. From original engineering assistance . . . through product selection, delivery and application, Westinghouse teams work closely with you.

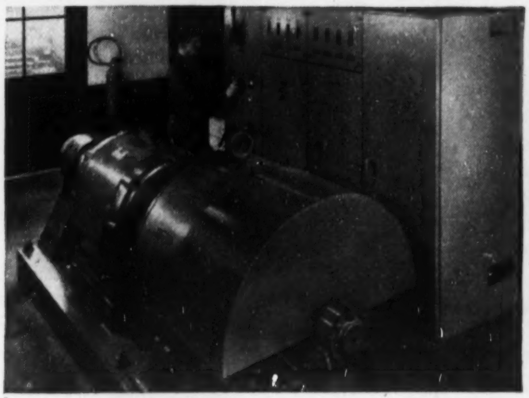
The construction application engineer in your nearest Westinghouse office is the key. One call to him will bring a team. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-94020

New York Central Railroad Bridge No. 8, Cleveland, O., has a 250′ lift span—twice as long as the one it replaced. Span moves 1′ a second to a height of 90′. Towers are 159′ high. Consultant: Howard, Needles, Tammen & Bergendoff, Kansas City, Mo., New York, N.Y., Cleveland, O. Erected by: McDowell Company, Inc., Cleveland, O. Electrical Contractor: The Dingle-Clark Co., Cleveland, O.

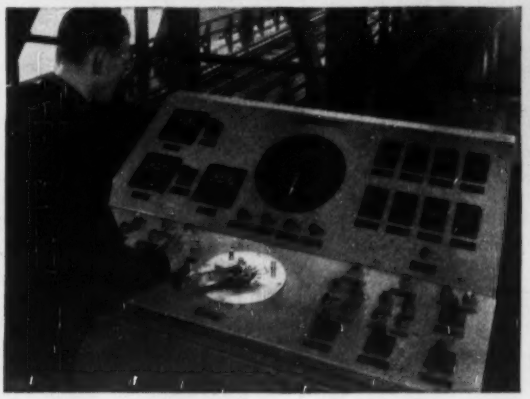


Westinghouse 135-hp, 230-volt d-c motor, background, operates from bridge center in conjunction with counterweights to move the 800-ton lift span. Brake control, foreground, stops the span at any position.

YOU CAN BE SURE...IF IT'S
Westinghouse



Westinghouse generator set, foreground, generates d-c power—150 kilowatts at 230 volts—to operate drive motor in center of bridge. Directly behind the generator set: control switchboard.



Westinghouse control desk gives operator complete and centralized control of all operating functions. It automatically slows lift span a short distance from bridge top or bottom, then inches it into place.

DOWN
TO
FUNDAMENTALS

SMALLER
AND
BETTER

KERN'S NK3 Precise Engineers' Level. The world famous engineering tool especially designed for accurate leveling.

The NK3 offers over 100 years of Swiss Master Craftsmanship and the latest technical achievements compressed into 4 lbs. of maximum precision, operational efficiency and economy.

- Mean leveling accuracy per mile (normal conditions) ± .008 Ft.
- Coincidence bubble is viewed directly through 30X telescope, allowing constant check on bubble centering while reading rod.
- Ready for use right out of the case. Highest precision leveling with coincidence spirit level and tilting screw. Coated optics give increased brilliance and contrast in the image.

MORE RELIABLE READING IN LESS TIME!

Ask for Detailed Brochure NK527

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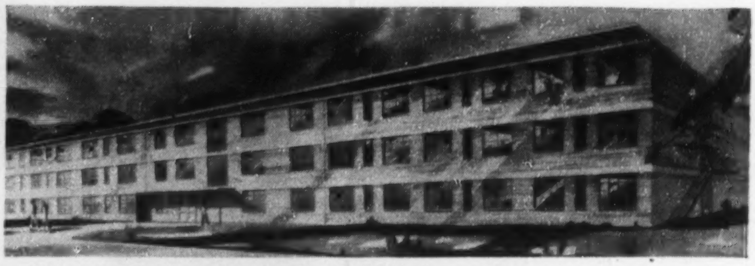
SERVICE DEPARTMENT
FACTORY TRAINED PERSONNEL

Kern AARAU

The FINEST in SURVEYING EQUIPMENT

KERN INSTRUMENTS INC.
68 Beaver St., New York 4, N. Y.



BRICK AND TILE CAVITY WALL DESIGN for Little Rock dormitories.

Air Force buildings near Little Rock, Arkansas

Dormitories at $8.62 per sq ft and combination mess halls and administration buildings at $15.40 are being built by J. H. Leveck & Sons, Little Rock, under the direction of the Corps of Engineers for the Air Force Base at Jacksonville, 18 miles from Little Rock, Ark.

For eight dormitories and two mess hall combinations the total contract is $2,151,448, distributed as shown in the accompanying analysis. A combination of 9½-in brick and tile cavity bearing walls with concrete slabs proved cheaper than all-concrete frames.

Concrete floor slabs are 8 in. with no drop panels. Roof slabs are 6-in. concrete plus 4 in. of rigid insulation.

Dormitories accommodate 200 men each with 76 bedrooms, six lounges. They are 207x40 ft, three-story.

Mess hall buildings, 134x112 ft and one-story, accommodate 500 men each, seat 296 in a 112x19 ft mess hall. The group squadron office is 80x16 ft; local issue is 83x20 ft, reception hall 16x16 ft, kitchen 48x29 ft. They have brick walls and a wood roof.

Work started June 6, 1954 and must be completed in 360 days. No liquidated damages are specified.

Minimum wages range from $3.25 for bricklayers, plumbers $2.88, electricians $2.75, cement masons $2.20, to $1.55 for truck drivers and $1.10 for laborers.

Bidders include:

1C	J. H. Leveck & Sons, Little Rock, Ark	$2,151,447
2	Branton & Hayes, Little Rock, Ark	2,252,675
18	T. C. Bateson Constr. Co., Dallas, Tex.	2,643,591
EE	U. S. Corps of Engineers, Little Rock, Ark.	2,330,813

Where the dormitory $s go—total cost $214,181 (1C)

Bids: 5-26-54 Items—for one	Cost	% of total cost
Excavation	$1,700	0.79
Clear & grub	200	0.09
Concrete in place	38,000	17.75
Fill	200	0.14
Masonry stone	54,681	25.54
Roof & sheet metal	7,000	3.27
Misc metals	5,000	2.33
Windows & screens	7,000	3.27
Ceramic tile	2,000	0.93
Floor covering	3,000	1.40
Lockers	10,000	4.67
Toilet access	800	0.37
Glass & glazing	800	0.37
Painting	6,000	2.80
Shades & blinds	700	0.33
Plumbing, heat & vent	60,000	28.02
Electric	10,000	4.67
Plaster	1,000	0.47
Mill work	2,000	0.93
Hardware rough & fin	2,000	0.93
Bond	2,000	0.93

Where the mess hall $s go—total cost $219,000 (1C)

Items—for one	Cost	% of total cost
Excavation	$2,000	0.91
Clear & grub	200	0.09
Concrete in place	22,900	10.45
Fill	300	0.14
Masonry	35,000	15.97
Roof & sheet metal	10,000	4.57
Misc metal	4,700	2.15
Windows & screens	6,500	2.97
Ceramic tile	4,000	1.83
Floor covering	3,000	1.37
Toilet access	500	0.23
Framing & mill work	15,000	6.85
Glass & glazing	1,000	0.46
Painting	7,000	3.20
Shades	300	0.14
Plumbing, heat & vent	50,000	22.82
Electric	10,000	4.57
Plaster	8,000	3.65
Hardware rough & fin	3,500	1.60
Kitchen equipment	30,000	13.70
Insulation	3,000	1.37
Bond	2,100	0.96

Concrete prices decide airport pavement job, Kan.

Bushman Construction Co., Kansas City, Mo., had a 1% edge under second low bidder Western Contracting Corp., Sioux City, Iowa, to net him $3,680,278 airfield pavement and drainage work at Forbes Air Force Base in Topeka, Kansas. Six contractors submitted bids for the job, four of them under the $4,247,984 estimate by the Kansas City District U. S. Corps of Engineers.

Construction of the airfield pavement requires 17-in concrete for its 12,000-ft length, 200-ft width; and 5,298 lin ft of 6- to 66-in storm drains. Work must proceed with the airfield in full operation and must follow whatever sequence is set by the engineers.

The two low bids were $38,819 apart. Bushman's prices for 16-in and 17-in concrete made him the low bidder. He was 9% and $79,185 under on the 16-in; 8% and $81,506 less on 17-in pavement.

Work started June 1, must be complete by August 15, 1955. Liquidated damages are $300 for each calendar day of delay.

Skilled labor receives a minimum of $2.50 per hour, semi-skilled $2.05,

Continued on following page

Airport, Kansas

Continued from preceding page

common labor $1.50. Highway transportation is available to site; railhead is on the base. Bidders include:

1C	Bushman Constr. Co., Kansas City, Mo.	$3,680,278
2	Western Contg. Corp., Sioux City, Iowa	3,719,097
6	MacDonald Constr. Co. & Coleman Constr. Co., St. Louis, Mo.	5,286,582
EE	U. S. Corps of Engineers, Kansas City 8, Mo.	4,247,984

Bids: 4-1-54 Item	Unit	Quantity	Unit Prices 1 C	2
Clear & prepare site	ls	1	$84,050	$25,000
Rem conc pvmt over 12"	sy	38,107	0.55	0.50
under 12"	sy	9,951	0.65	0.50
Excavation, uncl	cy	1,390,650	0.34	0.30
Storm drain pipe 6"	lf	76	4.50	3.35
8"	lf	60	5.25	3.75
15"	lf	539	7.75	6.10
30"	lf	760	11.50	9.50
36"	lf	1,622	15.50	13.50
42"	lf	488	18.50	14.60
48"	lf	4	27.00	17.70
54"	lf	713	27.00	24.70
66"	lf	1,036	31.50	30.70
Struct concrete	cy	339	75.00	80.00
Frame & grate, light	ea	31	31.50	30.00
MH frame & cover	ea	8	84.00	80.00
Road culv pipe 30"	lf	44	7.00	9.40
Ducts, in conc, 3", 4-way	lf	680	4.62	4.50
8-way	lf	360	7.15	7.70
4", 4-way	lf	2,485	4.81	4.80
6-way	lf	496	7.21	7.30
8-way	lf	720	7.91	8.00
12-way	lf	360	12.70	12.30
3-way	lf	297	4.00	4.70
1-way	lf	330	2.50	2.75
Ducts, parking apron, underpvmt, 4", 1-way	lf	266	3.50	3.10
2-way	lf	848	2.90	3.70
3-way	lf	828	4.00	4.70
4-way	lf	471	4.81	5.00
Cable, insul conductor	lf	6,500	0.27	0.30
Conc pvmt 8"	sy	151	4.00	3.50
9"	sy	757	4.25	3.90
16"	sy	219,957	3.79	4.15
17"	sy	220,287	4.03	4.40
Conc overlay pvmt	cy	347	8.50	11.30
Portland cement	bbl	313,900	3.30	3.30
Tie-down anchors	ea	867	2.00	5.00
Base crse for pvmt	ton	6,900	3.90	5.25
Bit surf crse, hot mix	ton	1,575	9.00	12.00
matl 100-120 pentr	gal	22,700	0.12	0.15
Cut-back asph MC	gal	8,800	0.12	0.15
RC	gal	875	0.16	0.15
Cover aggregate	ton	40	5.50	8.00
Fill core holes	ea	350	2.00	10.00
Seed	ac	235	112.50	150.00
Regrade, encase gas line	ls	1	2,800	7,500
exist pvmt at rnway intrsct	ls	1	73,750	40,000
Rem & salvg exist ammn storage bldgs	ls	1	2,700	5,000
Rem & reloc farm house	ls	1	7,500	7,000

Sewerage

Sewage treatment plant, Ontario, Canada

A 1.585 mgd activated sludge plant for Burlington, Ontario, will serve 16,000 people. James Kemp Constr. Co. Ltd. of Hamilton, Ontario, is building it for $C 286,000 ($US 291,000), 0.5% or $1,556 under the second bid. Seven firms tried for the job.

The contract price averages $17.88 per capita, $180,595 per mgd.

E. R. Swift, town engineer, designed the plant. Structures will be reinforced concrete. The contractor supplies all equipment and materials. Work started June 12, is scheduled for completion February 12, 1955.

Wages to be paid include a minimum of $2.10 per hour for skilled labor, $1.50 for semi-skilled, and $1.00 for common labor.

Highway transportation is available to site; railhead is one mile away.

Continued on following page

How to restore and preserve costly masonry structures with **D-J Mortar, Thorite, Thoroseal and Thoroclear** *even though masonry looks beyond repair!*

Second Episcopal Church of Boston, Brookline, Mass.

Only the bare skeleton of cornice remains after years of disintegration.

To repair, all loose material was cut out and complete surface was wire brushed in preparation of THORITE treatment.

Above photos show how vines grew over stone structure and hid most of damaged masonry.

Vines were cut away from building and disintegrated joints grouted with D-J Grouting Mortar.

Stone trim was then given two coats of THOROSEAL. Entire surface received a coat of transparent THOROCLEAR.

ALL MASONRY NEEDS PROTECTION

AFTER Brush and trowel coat of THORITE, nonshrink patching mortar was used to restore this masonry to its original lines. A two-coat application of THOROSEAL was applied to beautify and protect the surface. Nonsagging THORITE can be used to model any masonry structure back to its original lines.

Stretcher stone work treated with D-J Grouting Mortar and entire stone surface THOROCLEARED.

Get our pictorially-described literature, "HOW TO DO IT"

Standard Dry Wall Products, Inc.
NEW EAGLE, PENNSYLVANIA, U.S.A.

HOW TO BREATHE UNDER WATER

Tunnels like this project under the harbor at Boston would not be possible without dependable push-pull ventilation. That's why you see so much Naylor lightweight pipe in this vital service. Its proved dependability in push-pull operation is due to Naylor's exclusive lockseamed-spiralwelded structure which provides greater collapse strength and extra safety in a lightwall pipe. Naylor's one-piece Wedge-Lock coupling makes it a simple matter to install Naylor lines in tunnel construction because it permits the line to hug the wall and joints can be made up with only one side of the line in the open. For complete details write for Bulletins No. 507 and No. 514.

NAYLOR PIPE

Naylor Pipe Company • 1248 East 92nd Street, Chicago 19, Illinois
Eastern U.S. and Foreign Sales Office: 350 Madison Avenue, New York 17, New York

Sewerage plant, Canada

Continued from preceding page

Bidders include:

	Bidder	Amount
1C	James Kemp Constr. Co. Ltd., Hamilton, Ontario, Canada	$C286,064
2	Ontario Constr. Co., St. Catharines, Ont.	287,600
7	Pearce Constr. Co., Hagersville, Ont.	373,600

Bids: 5-27-54 Item	Unit	Quantity	Unit Price 1C
Clear & cleanup	ls	1	$C1,643
Exc, struct, topsoil	cy	175	0.77
earth und t-soil	cy	5,800	1.35
rock	cy	2,200	5.61
PC, f&p&handle–conc & msry	bag	14,600	0.80
Reinf stl,	lb	300,000	0.09
Conc msry excl cmt & reinf stl:			
grit tanks	cy	46	37.40
chlor house	cy	44	29.50
set & aer tnk-floor incl hoppers	cy	575	14.05
2" floor finish	sf	3,382	6.25
set & aer tnk-wall, walk	cy	531	46.14
diges tnk-floors	cy	156	13.26
walls, gasproof	cy	264	34.90
roof, gasproof	cy	103	55.31
pump sta & control bldg			
floors on ground	cy	66	15.85
intermed floor & roof	cy	94	51.90
walls	cy	128	36.63
columns	cy	12	52.00
retaining walls	cy	42	26.00
manholes	cy	17	33.55
conc suppt for pipe	cy	5	15.00
sidewk, outside steps	cy	6	64.00
fill conc B or C	cy	110	10.00
und conc sewP	cy	101	14.00
Superstruct, pump sta	ls	1	10,671
control bldg	ls	1	2,676
chlor house	ls	1	1,982
Timber incl baffles, walks	ls	1	573.00
Misc metal	ls	1	9,617
Incl exc below ground gr & bkfl excl below floors:			
conc sew P 18"	lf	60	5.10
24"	lf	362	6.56
30"	lf	345	8.67
CIP sew 12"	lf	12	7.00
bypass 18"	lf	15	16.25
drain 8"	lf	70	4.15
dewater drain incl conn	lf	195	3.60
Ci, stl, sew, sludge or scum P–all not incl above	ls	1	18,161
Valves, gate, manual	ls	1	4,963
hydraulic	ls	1	545.00
mud	ls	1	200.00
Shear gates	ls	1	545.00
CI force main incl exc & bkfl			
12"	lf	655	9.15
16"	lf	200	12.70
Incl exc & bkfl & hydrant:			
CIP 4" water main	lf	695	3.05
1" serv to pump sta	ls	1	112.00
chlor bldg	ls	1	186.00
⅝" serv to control bldg	ls	1	126.00
Grav rd incl gr & ditch	sy	3,900	1.21
Wire fencing	lf	1,665	4.14
Electrical system	ls	1	15,067
Pump, sludge, plunger type	ea	3	1,310
recirculating	ls	1	674 00
dewater	ls	1	786.00
Sludge heater & heat exchanger	ls	1	6,316
collectors–prelim tanks	ea	2	3,590
final tank	ea	2	3,004
Air compressor	ea	2	3,360
piping	ls	1	9,525
diffusers	ea	372	94.38
filter	ls	1	40.00
Gas control equip, pipe, pump	ls	1	5,930
Sew record, depth at grit tank	ls	1	425.00
rate at effl chmbr	ls	1	336.00
Oil stor tank, equip, pipe	ls	1	945.00
Ventilating system	ls	1	283.00
Temp indic for digest tanks	ls	1	153.00
Chlorinator	ls	1	2,358
Heat sys, pump station	ls	1	2,507
control bldg	ls	1	585.00
chlorine bldg	ls	1	210.00
Expansion jts	ls	1	666.00
Anchors into rock	ea	132	5.00
Extra work	ls	1	2,000

Alternate bids taken on Massachusetts sewers

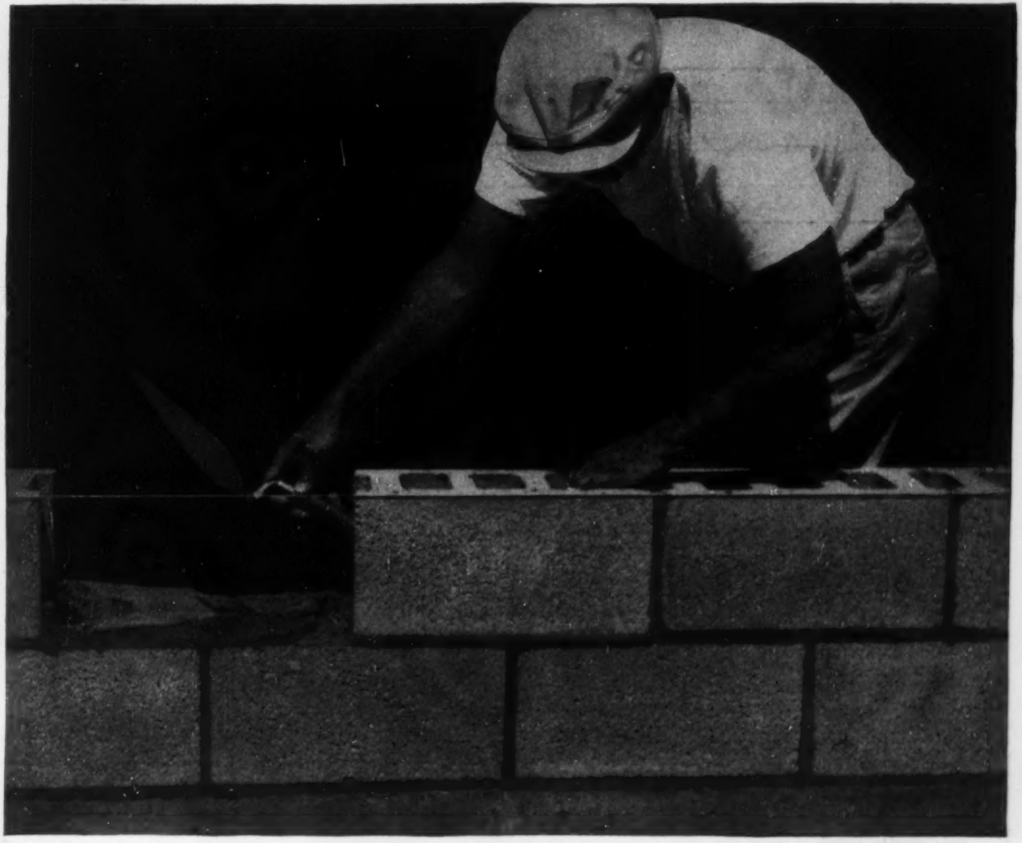
Sewer extensions costing $140,385, in streets and in easements through well-developed private property in the town of Natick, Mass., are underway by Elm Construction Co., Hyde Park, Mass.

Consulting engineers Haley & Ward of Boston asked for alternate bids on asbestos cement and vitrified clay sewer pipe. The Elm bid, using

Continued on following page

BRIXMENT

Better Mortar for Blocks

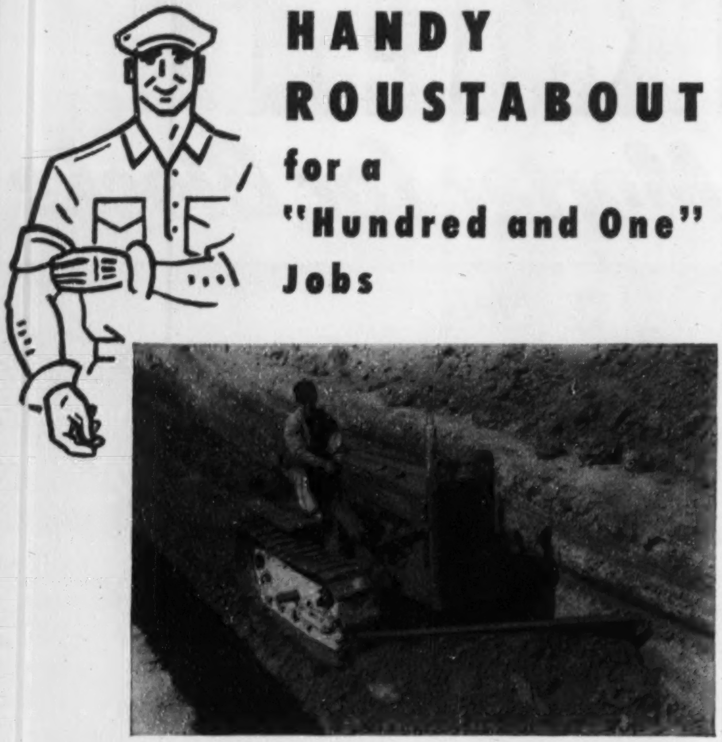


STAYS WORKABLE LONGER

To get a good bond between concrete blocks, the bricklayer must shift and adjust each block to its final position, before the mortar has stiffened.

Brixment makes it easier for the bricklayer to do this. Brixment mortar stays plastic longer in the wall because it has high water-retaining capacity, which provides greater resistance to the suction of the block. This gives the bricklayer more time to adjust and shift the block to its final position, while the mortar is still plastic enough to form a good, tight bond.

BRIXMENT
CEMENT FOR MASONRY
LOUISVILLE CEMENT CO.
BRIXMENT

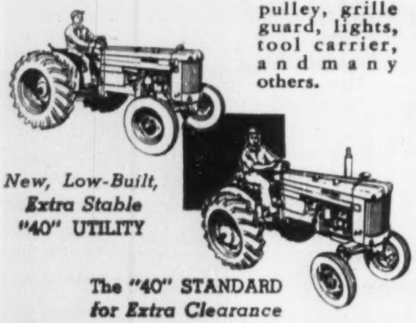


HANDY ROUSTABOUT for a "Hundred and One" Jobs

The *New* JOHN DEERE "40" Crawler with 4- or 5-Roller Track Assemblies

DEPENDABLE performance! Wide adaptability to all-around work! Outstanding economy! These are features that have always been found in John Deere Tractors. You'll find them in full measure in the "40" Crawler, which delivers 25 horsepower on the belt, 20 horsepower on the drawbar.

New, longer tracks (4- or 5-roller) prevent "nosing in" when heavy tools are used. "Live" hydraulic power and deep cushion seat make work easier for the operator. Attachments include high-speed and regular PTO, belt pulley, grille guard, lights, tool carrier, and many others.



New, Low-Built, Extra Stable "40" UTILITY

The "40" STANDARD *for Extra Clearance*

Some of the Many Tools for "40" Crawler and Wheel-Type Tractors

- Angle Dozer (Shown)
- Back Fill Blade
- Back Hoe
- Cement Mixer
- Crane
- Loader
- Mower
- Rear Angle Blade
- Post-Hole Digger
- Rotary Sweeper
- Saw
- Scoop
- Wheel Scraper or Carry-All
- Winch

. . . and many others.

●

Write for free literature on the particular tractor and equipment you are interested in.

JOHN DEERE QUALITY FARM EQUIPMENT

JOHN DEERE • Moline, Illinois

Dept. EN-1

Mass. sewers

Continued from preceding page

asbestos cement pipe, was lowest of 15 submitted by eight contractors. The second bidder, Ralph Richard Co., was lower on the vitrified clay pipe alternate by $12,000 but 3% higher ($4,105) on the whole bid.

What swung the award was lower excavation and loaming and seeding prices.

All materials will be furnished by the contractor.

December 31 is completion date for the job.

The contractors listed below are ranked for bids on the alternate chosen.

Bidders include:

1C	Elm Construction Co., Hyde Park, Mass.	$140,385
2	Ralph Richard Co., Dedham, Mass.	152,655
8	Andreasse & Co., Roslindale, Mass.	247,257

Bids: 8-9-54 Item	Unit	Quantity	Unit Prices 1 C	2
Exc, earth, sew-street	cy	2,400	$2.25	$6.00
priv prop	cy	600	3.50	6.00
conn-street	cy	400	3.50	6.00
priv prop	cy	2,000	4.00	6.00
rock, sew-street	cy	2,000	2.00	6.00
priv prop	cy	550	10.00	6.00
conn-street	cy	350	10.00	6.00
priv prop	cy	1,700	10.00	6.00
VCP sew f&p 8" alt 1	lf	9,500	(3.70)	2.50
5" alt 1	lf	6,650	(5.00)	1.50
fittings alt 2	list	1	(750.00)	750.00
*ACP sew f&p 8" alt 2	lf	9,500	2.50	3.00
5", bldg. alt. 2	lf	6,650	3.20	2.00
branch conn 8x5" alt 2	ea	140	10.00	6.00
Gravel, bank	cy	1,700	2.00	2.00
screened	cy	300	3.00	3.00
Masonry, brick	cy	150	65.00	40.00
concrete	cy	75	15.00	20.00
MH frame & cov	set	50	50.00	40.00
priv prop	set	20	50.00	40.00
steps	ea	260	1.50	1.25
House serv conn	ea	100	15.00	30.00
Asb cem force main f&p				
6"	lf	680	4.00	2.00
8"	lf	2,110	4.50	3.00
Resurf gravel base	cy	1,000	4.00	2.50
temp-"cold patch"	sy	2,600	1.25	1.00
sidewalk	sy	950	1.50	2.00
Loam & seed	sy	7,200	0.50	2.00
State hway crossing	ls	1	1,000	1,500
" " " pump sta.	ls	1	1,000	1,500

* Alternate 2 selected

Waterworks

Water treatment plant to cost $171,000 per mgd

A new 16 mgd water treatment plant to serve Tonawanda in Erie County, New York, will cost $2,745,000. This is $171,000 per mgd and $188 per capita, based on the 14,617 inhabitants reported in 1950 census.

The consulting engineers, Nussbaumer, Clarke & Velzy, Buffalo, took separate bids on three divisions of the work.

The main contract went to James McHugh at $2,578,000 for treatment plant structures, filters, instruments, piping. This accounts for 93.6% of the total cost.

Plumbing, heating and ventilating at $90,500 account for 3.6% and will be handled by George D. Clucas, Inc.

Electrical work by Bison Electric Construction Co., Inc. will be $76,470 or 2.8%.

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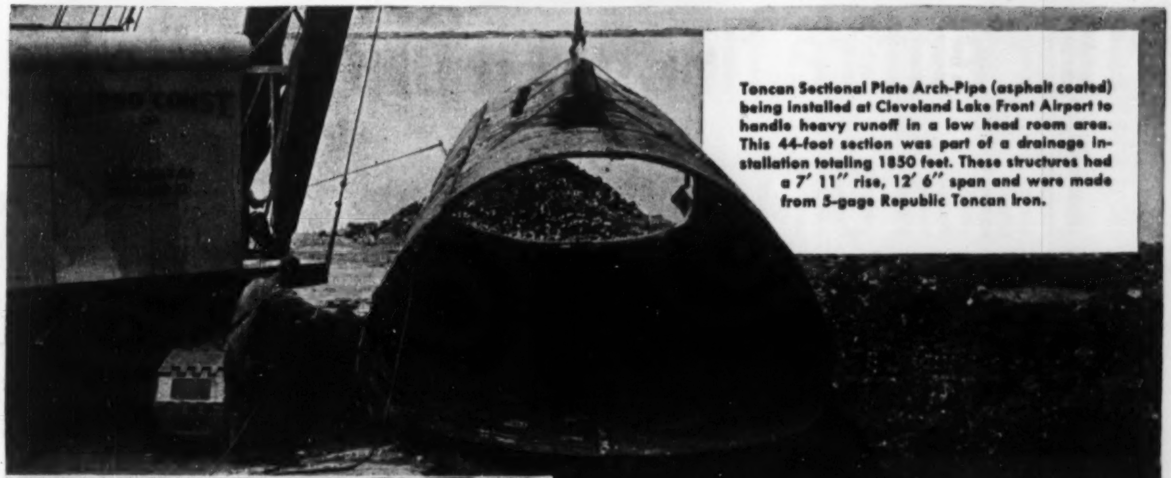
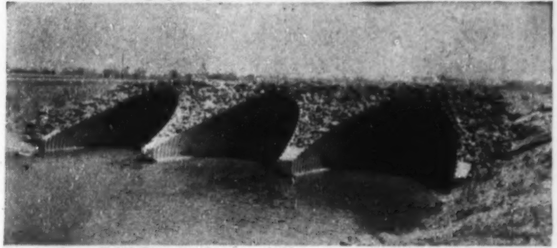


Toncan Sectional Plate Arch-Pipe (asphalt coated) being installed at Cleveland Lake Front Airport to handle heavy runoff in a low head room area. This 44-foot section was part of a drainage installation totaling 1850 feet. These structures had a 7′ 11″ rise, 12′ 6″ span and were made from 5-gage Republic Toncan Iron.

Toncan Corrugated Metal Pipe was used under heavy railroad fill near Shamrock, Texas. Fill was 45 feet. These 72-inch-diameter pipes were fabricated from 8-gage Republic Toncan Iron.



Triple Type "C" Toncan Sectional Plate Arch was installed to carry a stream under a runway at the Niagara Falls Air Force Base. Each arch is 270 feet long with 14-foot span, 6′ 5¼″-rise, with both ends sloped 1 on 2. 3-gage Republic Toncan Iron was used. Type "C" refers to method of fastening arch to abutment with angle irons.

Fast, low cost installations that last for years with TONCAN DRAINAGE PRODUCTS

Toncan Drainage Structures are easily installed in any weather with unskilled labor. Lightweight, preformed sections reduce shipping, handling and installation costs. A single order covers all needed materials.

And you never need to worry about Toncan Drainage Structures. They are unaffected by impact, vibration, shifting soils or severe weather changes. These low cost drainage structures are available in Republic Copper Steel, or in Republic Toncan Iron with the highest rust-resistance of any ferrous metal in its price class.

Contact one of the Toncan Drainage Products manufacturers listed below for "specs" and engineering data. Or write:

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Toncan Drainage Products are made from Republic Toncan Iron and Republic Copper Steel

Corrugated Metal Pipe • Perforated Corrugated Metal Pipe • Sectional Plate Pipe • Sectional Plate Arches • Corrugated Metal Arch-Pipe • Sectional Plate Arch-Pipe • CorWel Subdrainage Pipe • Asphalt Coated Pipe • Asphalt Coated and Paved Pipe.

Call the Toncan Man — that's your best drainage plan
TONCAN

Manufacturers of Toncan Drainage Products

BEALL PIPE & TANK CORPORATION
PORTLAND, ORE.
BOISE, IDAHO
BERGER METAL CULVERT CO., INC.
WESTMINSTER STATION, VERMONT
THE BOARDMAN CO.
OKLAHOMA CITY, OKLA.
TULSA, OKLA.
BLUEGRASS PIPE & CULVERT CO.
LOUISVILLE, KY.
CENTRAL CULVERT CORPORATION
ALEXANDRIA, LA.

CHOCTAW, INC.
MEMPHIS, TENN.
DOMINION CULVERT & METAL CORP.
ROANOKE, VA.
EATON METAL PRODUCTS CORP.
OMAHA, NEB.
HUTCHINSON, KAN.
EATON METAL PRODUCTS COMPANY
BILLINGS, MONT.
EMPIRE STATE CULVERT CORP.
GROTON, N. Y.

ILLINOIS CULVERT & TANK CO.
PEORIA, ILL.
JENSEN BRIDGE & SUPPLY COMPANY
SANDUSKY, MICH.
H. V. JOHNSTON CULVERT CO.
MINNEAPOLIS, MINN.
ABERDEEN, S. DAK.
LOGANSPORT METAL CULVERT CO.
LOGANSPORT, IND.
M & M HIWAY MATERIALS CO.
COLUMBIA, MO.
NORTH DAKOTA METAL CULVERT CO.
FARGO, N. DAK.

REPUBLIC STEEL CORPORATION
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CANTON, OHIO
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DALLAS, TEX.
HOUSTON, TEX.

"Our entire fleet is lubricated with Union Oil products . . ."

S. H. Moore, Manager, San Diego Transit-Mixed Concrete Co., San Diego, California

"The 47 transit-mix trucks in our fleet pile up an average of 750,000 miles per year, while our 14 tractor and double-trailer cement hauling units cover about 450,000 miles.

"We maintain tight delivery schedules year 'round over rough, dusty terrain as well as in heavy traffic areas. Our entire fleet is lubricated with Union Oil products, and has been for the past 14 years. That we have had absolutely no mechanical difficulties due to failure of our lubricants speaks volumes for Union's oils and greases, used 100% at San Diego Transit-Mix."

Union Oil Company products are *the finest* by far for your equipment, too. Call your Union Oil representative for a survey of your lubrication requirements. His recommendations can save time and money on every job.

76

UNION OIL COMPANY

OF CALIFORNIA

LOS ANGELES: Union Oil Bldg. • NEW YORK: 45 Rockefeller Plaza • CHICAGO: 1612 Bankers Bldg. • NEW ORLEANS: 644 National Bank of Commerce Bldg. • ATLANTA: 401 Atlanta National Bldg. • KANSAS CITY, MO.: 921 Rialto Bldg.

Water treatment plant

Continued from preceding page

Wage rates in the Buffalo area range from $3.05 per hour for inside electric workers, $3.00 for plumbers and steamfitters, and $2.905 for carpenters to $2.18 for common labor.

Bidders include:

1C James McHugh Constr. Co., Chicago, Ill.	$2,577,860
2 The Pitt Constr. Co., Pittsburgh, Pa.	2,718,855

Bids;7-28-54 Item	Unit	Quantity	Unit Prices 1 C	 2
Division 1				
Steel H-piles 10"	lf	21,600	$4.50	$3.50
8"	lf	25,500	4.25	3.15
Treat plant struct	ls	1	1,340,000	1,432,000
Freight elevator	ls	1	25,000	26,400
Lab furn & equip	ls	1	10,000	12,870
Residual recorders	ea	2	3,000	3,200
Instrument & contrl equip	ls	1	150,000	166,700
Pretreat equip	ls	1	230,000	260,500
Filter & water supply piping & valves	ls	1	202,700	209,600
Wash water pump, prime sys, vlv & piping	ls	1	9,000	14,400
Sluice gates	ea	6	3,000	3,000
Filter underdr sys A	ls	1	30,000*	22,500*
B	ls	1	27,000	37,660
sand & gravel	ls	1	8,000	14,500
surf wash sys	ls	1	10,000	22,800
Quick mix basin equip	ls	1	5,600	5,810
Dry chem feed equip	ls	1	30,000	32,950
Chlorination equip	ls	1	21,000	25,700
Chem feed pipe & acces	ls	1	26,000	23,500
Chlor scales & cyl equip	ls	1	13,000	11,250
Dehumid equip & duct work	ls	1	14,500	11,250
Air compress & acces	ls	1	600.00	900.00
Fork lift truck & battry charger	ls	1	3,000	4,880
Wash water tank	ls	1	31,000	31,450
Outside piping:				
Raw water 36"	lf	165	75.00	106.00
Treated water 30"	lf	1,530	32.00	43.00
Plant watr 12"	lf	540	12.00	9.00
6"	lf	200	3.60	6.00
Reverse flow check vlv & vaults	ea	2	17,500	15,300
Gate valve & vault	ls	1	13,300	10,400
Hydrant	ea	1	300.00	250.00
Filt water line 48"	lf	260	130.00	125.00
Sanitary sew line	lf	160	10.00	10.50
Septic tank	ls	1	500.00	1,200
Storm drain 15" dia	lf	160	6.00	10.00
12"	lf	160	5.00	14.00
Catch basin	ea	9	210.00	150.00
6" gate vlv & vlv box	ea	2	100.00	125.00
Site improvement	ls	1	38,000	22,000

Division II

1C Geo. D. Clucas Inc.	$90,500
2 C. H. M. Dechert, Inc	94,912
3 Geo. H. Drake Inc	108,006

Item (lump sum)	Cost	% of total mech cost
Plant water service piping	$15,990	17.67
Roof, floor & equip drains	14,000	15.47
Sump pump & piping	500	0.55
Sampling pumps & piping	1,010	1.12
Plumb fixt, equip, & waste drains	6,100	6.74
Ventilation work	3,000	3.31
Heating system	49,900	55.14

Division III

1C Bison Elec. Constr Co., Inc	$76,470
2 Stroh Elec. Construction Corp	80,800
3 Lang Elec. Co., Inc	87,948

Item (lump sum)	Cost	% of total elec. cost
Primary & sec elec & tel undergrnd conduits & conductors	$15,000	19.62
Elec switchgear, motor start & transformers	18,450	24.13
Power wiring & distr panels	13,140	17.18
Light fixt, d str panels & wiring	27,900	36.48
Inter-communication system	1,980	2.59

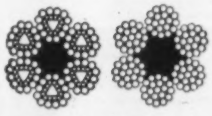
Summary of total cost:

Total cost	$2,744,830	100.0
Structural	2,577,860	93.6
Incl: Treat pl structs	(1,340,000)	(48.9)
Freight elevator	(25,000)	(0.9)
Instruments & recorders	(153,000)	(5.5)
Pretreat equip	(230,000)	(8.4)
Filter, watr & sew P & vlv	(202,000)	(7.3)
Plumbing, heating, ventilating	90,500	3.6
Electrical	76,470	2.8

* Not included in total bid

PROVING EXTRAORDINARY SERVICE—A Hercules Flattened Strand crane rope delivered 18 months service, compared to 6 months for ordinary rope. It performed equally well as a clamshell bucket rope. On a hot ladle crane it outlasted round strand rope by 4 to 1. It was chosen for its super strength to haul the car on the continent's largest cableway at Kitimat.

Can Flattened Strand solve your special wire rope problem?



Flattened Strand Round Strand

Hercules Flattened Strand is a special kind of wire rope that provides extraordinary service on special kinds of jobs.

The key to the difference is the triangular shape of the strands. Notice how the strands support each other; how the rope circumference is almost perfectly round; and how the core is smaller. There is 10% more steel in Hercules Flattened Strand than in round strand ropes of the same diameter. That means *10% more strength* and *10% greater safety*. Flattened Strand wears longer and more evenly...and is easier on sheaves and equipment.

If you can use this Super-rope, you'll soon begin saving time, labor, money. Why not investigate?

Because Leschen pioneered and perfected Hercules Flattened Strand wire rope, Leschen is your best source of additional information. Ask your Leschen man, or write for "The Flattened Strand Story."

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE

NEW

FOR ANY JOB
FOR ANY HEIGHT

ROOSHOR
EXTENSION TYPE

The new ROOSHOR, extension type, 8 ft. to 14 ft. (full 6 ft. adjustment) is always ready for instant use at any height . . . may be used as a flat-head shore, a male-head shore and as an extension shore by merely inserting any length S4S 4x4 into the steel head. Full 6 ft. adjustment is at your command with or without the extension. Wooden upper members permit easy fastening of lateral or diagonal bracing.

THE STANDARD ROOSHOR

This adjustable wood-head shore offers instant and accurate adjustment within the range of three sizes: 8 ft. to 14 ft.; 7 ft. to 13 ft.; and, 5 ft. to 9 ft.

ROOS COLUMN CLAMPS

Two identical hinged units that eliminate waste time in fitting and adjusting . . . foolproof . . . automatically square the column forming.

"USED BY CONTRACTORS COAST-TO-COAST OVER 35 YEARS"

Rooshors and Roos Column Clamps are available for rental with purchase option from warehouse stocks in principal cities.

Write for Bulletin No. 354.

BAKER-ROOS, INC.
P. O. Box 892 • INDIANAPOLIS 6, IND.

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Gentlemen:
Without obligation, please send additional information on Rooshors and Roos Column Clamps.

Name__________
Company__________
Address__________
City__________ State__________

Mianus River dam & reservoir, Connecticut

Merritt-Chapman & Scott Corp. edged second bidder by 0.6% to take the $745,000 Mianus River dam and reservoir contract awarded by Greenwich Water Company. The project site is in Fairfield County, Connecticut. Consulting engineers are American Water Works Service Co., Inc., Philadelphia, Pa.

The project is designed to insure an adequate water supply for the communities of Greenwich, Conn., and Port Chester and Rye, N. Y.

The dam—375,000 cubic yards of earth and rock fill—will be 77 feet high, 1,200 feet long; 430 feet across at its base, 20 feet across at the top.

Supplying a three-mile-long reservoir, watershed above the dam has 18 square miles.

To clear over 200 acres of forest with an expected yield of 1,000 Mfbm lumber, the successful contractor bid $45,000 or 57% under second-low. Both horses and trucks were used. Second bidder Peter Mitchell Inc. was low by the same amount on diversion and control of stream during construction. At the end, only $4,446 separated the two low bids.

Completion date is Dec. 31, 1954.

Minimum wages include $2.75 per hour for operating engineers, $3.00 for carpenters, $3.25 for masons, $3.975 for ironworkers, $2.30 for common labor, and $1.98 for truck drivers.

Bidders include:

1C	Merritt-Chapman & Scott Corp., New London, Conn	$745,000
2	Peter Mitchell, Inc., Greenwich, Conn	749,446
12	The Grandview Constr. Co., Mt. Vernon, N. Y	1,225,308

Bids: 2-15-54 Item	Unit	Quantity	Unit Prices 1 C	2
Clearing	ac	225	$150.00	$350.00
Strip & grub	cy	18,000	0.70	1.00
Divert stream dur constr	ls	1	94,821	50,000
Exc, common:				
outlet cond sys	cy	9,000	0.60	0.75
cut-off trnch for dam	cy	36,000	0.60	0.75
wasteway channel	cy	15,000	0.55	0.60
Exc, rock-outlet cond sys	cy	1,000	4.50	8.00
c-off wall, dam	cy	140	8.00	10.00
wasteway chanl	cy	15,000	2.75	4.00
Embank, roll-constr exc	cy	62,000	0.57	0.15
borrow area	cy	285,000	0.66	0.55
Cr stone blanket	cy	5,500	4.50	7.00
Sand & grav filter	cy	6,200	2.25	2.15
Rock face-upstream dam	cy	10,000	3.50	1.50
toe	cy	3,200	3.50	2.50
Stone topping-dam & rd	cy	500	4.50	6.00
riprap dumped	cy	2,000	3.50	2.00
Seed-downstr dam & chnl	sy	25,000	0.50	0.60
Diamond drilling	lf	6,000	3.30	5.90
Grout pipes	lf	1,500	1.50	2.00
Pressure grouting	bag	10,000	3.50	2.00
Conc B—2,500 psi:				
cut-off dam wall	cy	330	40.00	35.00
pipe fndn	cy	700	22.00	18.00
pump sta fndn	cy	50	47.00	30.00
Conc A—3,300 psi:				
still basin walls	cy	500	50.00	50.00
conc piers	cy	10	60.00	50.00
s-basn slab & pmp sta floor	cy	150	30.00	35.00
Reinf steel	lb	65,000	0.20	0.18
Top sp'lway sect—8" conc pipe, f&p	ls	1	2,000	7,000
Lock jt conc P, instl 96"	lf	410	20.00	30.00
30"	lf	470	3.60	10.00
20"	lf	480	3.60	9.00
Steel seepage rings	lb	30,000	0.27	0.45
CIP & fit, instl 30"	lf	45	4.00	20.00
20" rem	lf	1,700	5.50	2.50
instl	lf	1,080	3.00	3.50
Valve, instl 30"	ea	2	100.00	200.00
20"	ea	7	100.00	175.00
Venturi tubes, 20", instl	ea	2	100.00	175.00
Pump sta superstruct	ls	1	9,000	16,000
VCP drain 8"	lf	500	1.25	3.00
12"	lf	450	2.00	4.50
24"	lf	210	7.00	8.00
Manhole, drain	ls	1	1,000	1,650
valve	ls	1	500.00	1,450
Grav around vit tile drn	cy	450	6.00	6.00
VCP drain 6"	lf	530	1.00	2.00
Metal water stop	lf	200	2.00	3.00
Intake struct & scrn—for 30" outlet pipe	ls	1	1,000	850.00
Pipe railing	lf	163	8.00	2.00

Tight bidding for Calif. small water mains

The San Diego Water Department, California, received a $112,925 low bid on small water main replacements for 41 different streets 0.7% under second low and 1.1% under third bid. W. C. Brown is Principal Civil Engineer.

Floyd Shofner, Puente, Calif., will replace 2-in wrought iron mains installed years ago with 24,790 ft of 4-, 6-, and 8-in asbestos cement pipe. All new pipe will be supplied by the city.

Large differences between the two low bids cancel each other out and leave Shofner a $797 margin. Second bid by Pace Constr. Co., National City, Calif., is 13% and $6,345 less on 6-in asbestos cement pipe. The Shofner bid is $4,315 and 28% under second for ¾-in service lines; $2,342 and 16% under for 2-in highline.

Six months are allowed for completion of the job.

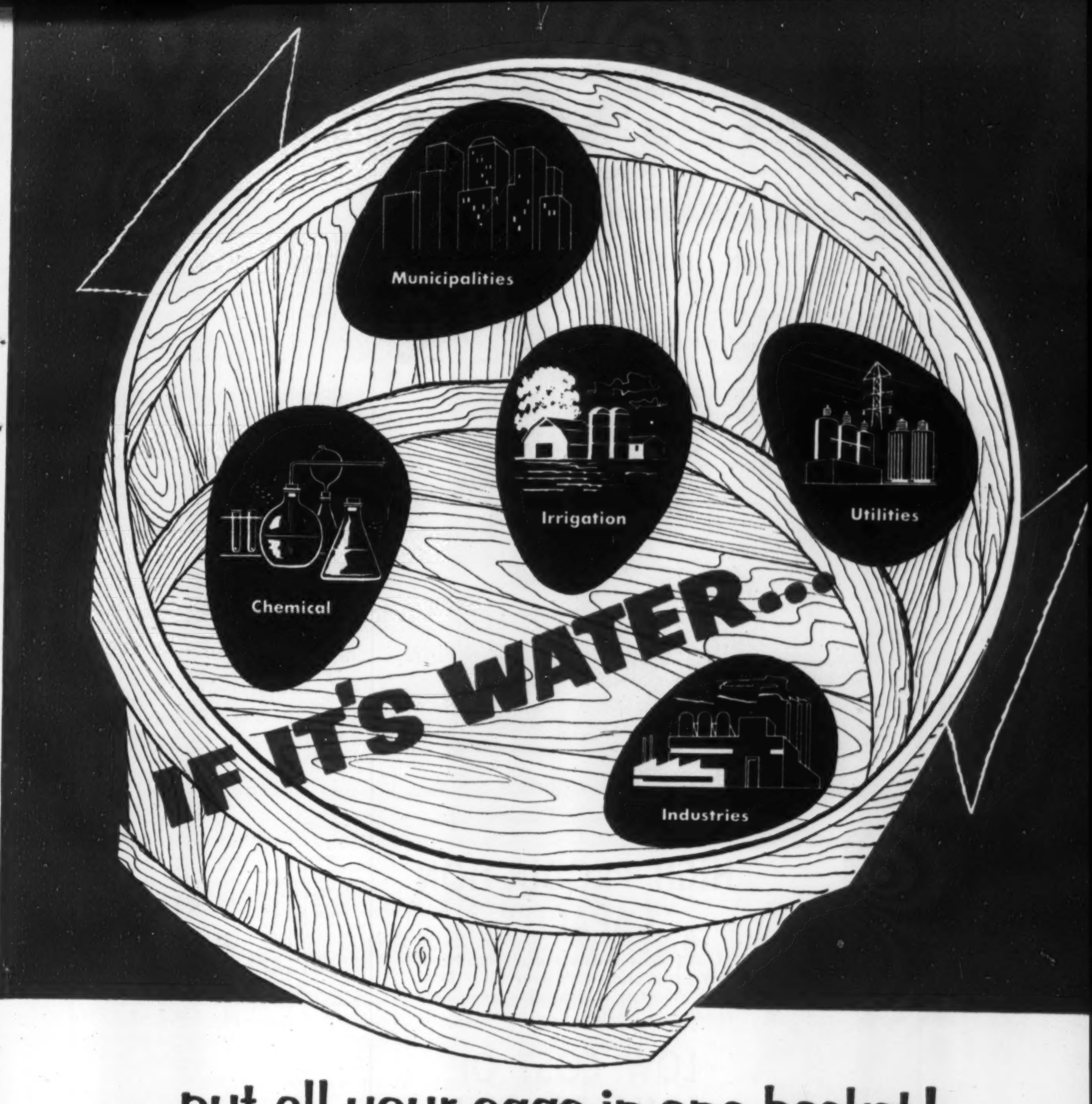
Skilled labor receives a minimum of $21.84 per day, semi-skilled $17.04, common labor $16.40.

Railhead is five miles from the work site.

Bidders include:

1C	Floyd Shofner, Puente, Calif	$112,925
2	Pace Constr. Co., National City, Calif	113,722
5	W. A. Robertson & Co., San Diego, Calif	138,267

Bids: 7-13-54 Item	Unit	Quantity	Unit Prices 1C	2
ACP 8"	lf	6,840	$3.00	$2.69
6"	lf	17,625	2.80	2.44
4"	lf	325	2.60	2.00
Excavation	cy	15	8.00	6.00
Gate valve hub end 8"	ea	10	20.00	25.00
6"	ea	19	15.00	25.00
4"	ea	1	15.00	20.00
Fire hydrant 6"	ea	21	250.00	263.00
exten	lf	20	30.00	10.00
Tap 3/4"	ea	478	5.50	4.95
1"	ea	2	7.50	5.50
Angle stop 3/4"	ea	478	5.00	4.50
1"	ea	2	6.00	5.70
Service line 3/4"	lf	7,845	1.40	1.95
1"	lf	40	2.00	2.60
Copper couple 3/4"	ea	5	7.50	10.00
Highline 2"	lf	15,610	0.80	0.95
Shackles 8" & 6"	ea	12	20.00	25.00
Conc anchors	cy	15	25.00	20.00
Encasement	ea	5	30.00	35.00
Connect to highline	ea	5	10.00	10.00
hydrant	ea	1	30.00	75.00
Asph conc pvmt 1"	sy	535	1.00	2.75
2"	sy	40	3.00	3.10
3"	sy	5	5.00	3.50
4"	sy	90	6.00	6.40
5"	sy	60	7.00	6.75
6"	sy	150	7.70	7.10
Conc 4" & 1" asph conc	sy	170	7.70	6.50
6" & 2" asph conc	sy	25	9.25	9.00
Blowoff 3"	ea	1	125.00	110.00
Light grading	sy	1,000	0.40	0.29
Exc for connect	ls	1	1,400	4,000



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Concrete pipe cast "in the ditch"

New process produces five pipes per hour with one set of forms—costs reduced, quality is improved

An old concrete pipe manufacturing
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The

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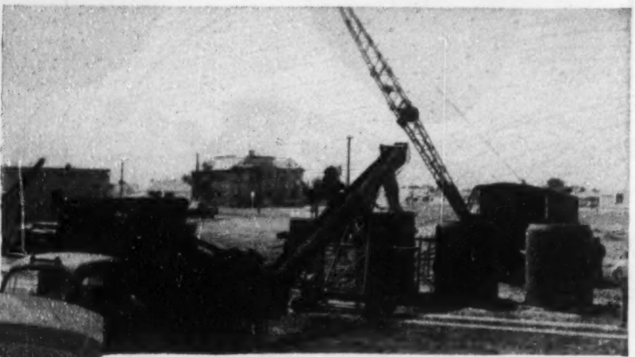

Manitoba SUPERCRETE Ltd. making 54" and 60" x 6' VIBRAPIPE in open prairie southeast of Winnipeg, Canada.

48" x 8' ASTM C-76 VIBRAPIPE with baby bell made by LONGHORN in Edinburg, Texas.

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Welded steel pipeline for Calif. water supply

Twelve contractors submitted bids on 4.05 miles of pipeline in Los Angeles County. F. W. Case Corp. and Hood Constr. Co., Lynwood, Calif., put in a $1,502,000 joint low bid 2% under second-low bid. Robert B. Diemer, General Manager and Chief Engineer for the Metropolitan Water District of Southern California, is in charge of the project.

This job will be part of the Colorado River Aqueduct distribution system. To be built are 1.42 miles of 79-in and 2.63 miles of 37-in welded steel pipe with spun mortar lining and reinforced gunite exterior.

The Case & Hood bid on 79-in pipe is 8% and $49,350 under second bid; on 37-in pipe it is $38,005 and 10% lower.

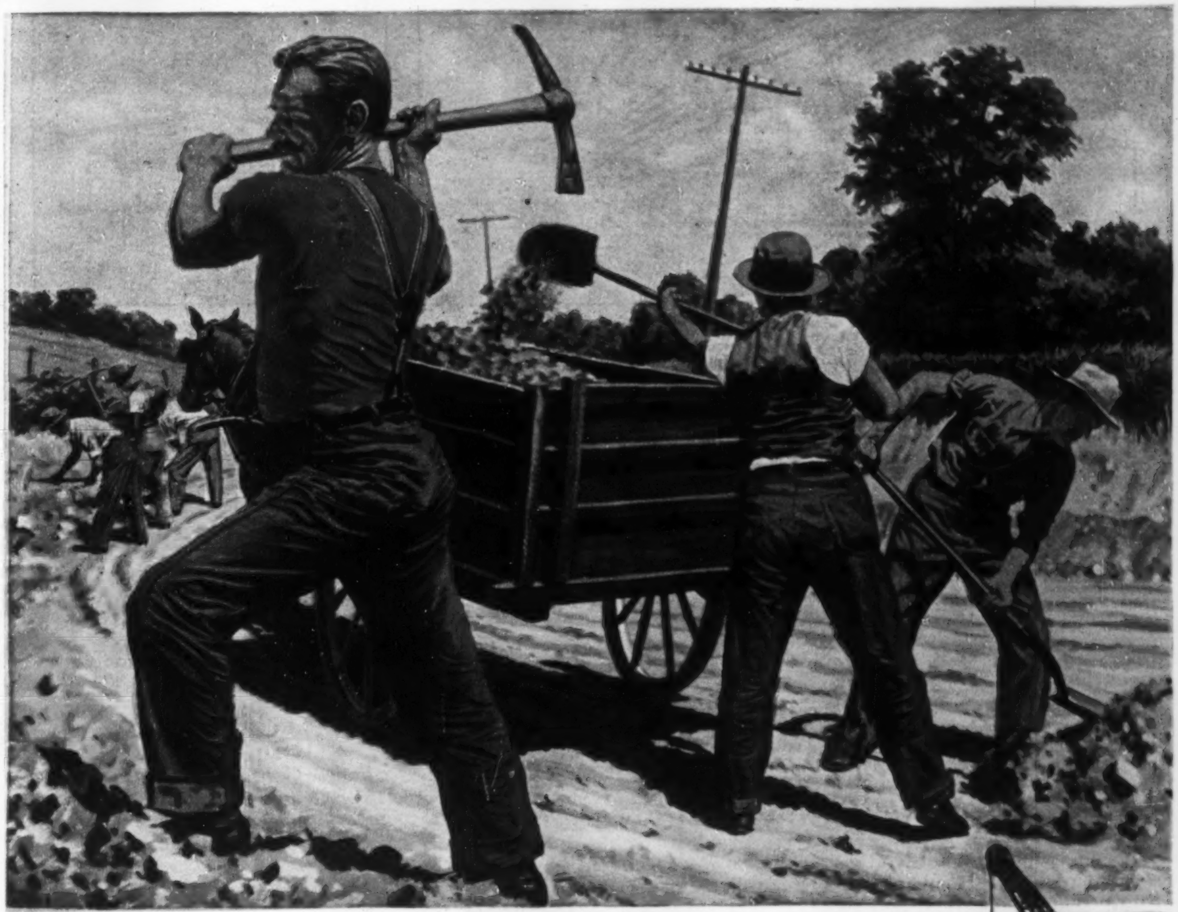
Work starts Aug. 30 and must be complete June 30, 1955.

Minimum wages prevailing in the Los Angeles area provide $2.50 per hour for gunite gunmen, $3.125 for pipefitters and plumbers.

Bidders are.

1C	F. W. Case Corp. and Hood Constr. Co., P.O. Box 112, Lynwood, Calif	$1,502,156
2	Encon Corp., Los Angeles 21, Calif	1,539,092
12	B. J. Ukropina, T. P. Polich, Steve Kral & John R. Ukropina, San Gabriel, Calif	1,985,223

Bids: 6-24-54 Item	Unit	Quantity	Unit Prices 1 C	2
79" pipe				
Exc, trench	cy	43,000	$1.70	$2.00
structures	cy	500	4.50	5.00
Backfill	cy	31,000	2.50	1.00
sand	cy	3,000	2.40	3.50
rock	ton	100	5.40	6.00
Conc, structures	cy	130	57.00	70.00
pipe casing, suppts	cy	275	51.00	50.00
Reinf stl: structs, pipe case, f&p	lb	28,000	0.12	0.25
Spun mortar lined welded steel pipe, 79" ϕ f&p: plate thick 11/16"	lf	6,325	77.00	83.00
23/32"	lf	1,140	78.00	88.00
Casing, jacked or tunnel, 79" ϕ welded stl pipe	lf	58	135.00	124.00
Ext coat: pipe, thimble, stl plate specials	sf	159,000	0.44	0.38
Int lining-thmbl & stl plate specials	sf	2,300	0.73	0.75
Stl MH & pipe outlets, f&p	lb	10,000	0.70	0.80
Stl plate specials, f&p	lb	68,000	0.45	0.55
Instl misc metalwork	lb	40,000	0.12	0.25
Cement, furnish	bbl	2,700	4.50	4.10
CIP sew reconstruct f&p 6"	lf	100	8.00	6.00
8"	lf	100	10.00	8.00
Remodel house connect sew	lf	100	10.00	12.00
37" pipe				
Exc, trench	cy	36,000	2.00	2.00
structures	cy	300	4.50	5.00
Backfill	cy	29,000	2.20	1.00
sand	cy	2,500	2.40	3.50
rock	ton	150	5.40	5.00
Conc, structures	cy	160	57.00	70.00
pipe case, suppts	cy	125	51.00	50.00
Reinf stl-structs, pipe case, f&p	lb	25,000	0.12	0.25
Spun mortar lined WSP, 37" ϕ, ⅜" plate, f&p	lf	13,820	24.40	27.15
Casing, jacked-37" ϕ WSP	lf	147	77.00	92.80
Ext coat-pipe, thimble, stl plate specials	sf	137,000	0.44	0.38
Int lining-thimbles & stl plate specials	sf	100	0.75	0.75
Stl MH & pipe outlet, f&p	lb	15,000	0.70	0.80
Stl plate specials, f&p	lb	2,000	0.60	0.66
Instl misc metalwork	lb	42,000	0.11	0.25
Cement, furnish	bbl	2,300	4.50	4.10
CIP sew reconstruct f&p 6"	lf	500	8.00	6.00
8"	lf	100	10.00	8.00
Remodel house connect sew	lf	100	10.00	12.00



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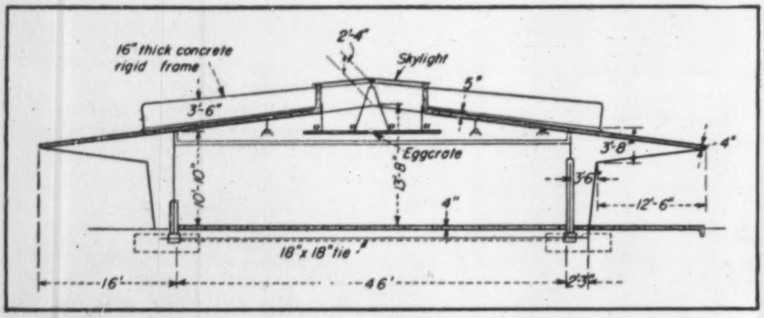
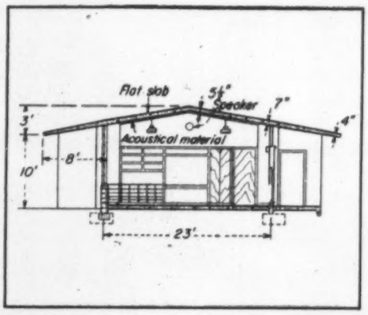
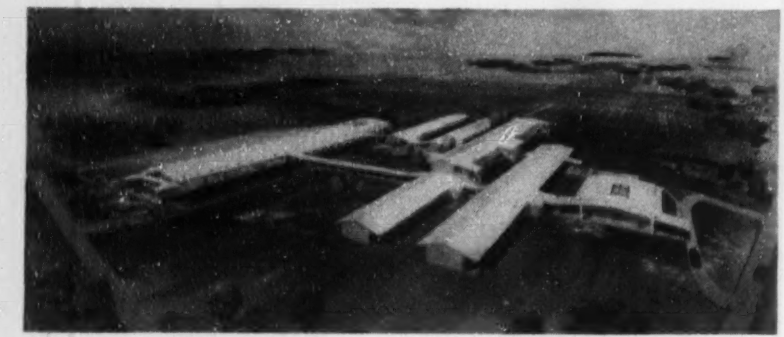


CONCRETE RIGID FRAMES in a wide wing of Northwest Dade Junior High School, Florida, have long overhangs to cut glare.



THIN FLAT SLAB forms roof over narrow wings.



FLORIDA SCHOOL consists of several wings which separate different activities. The widest houses auditorium and shops; the narrowest, classrooms.

Spread-out school built at low-cost

By holding the design of Northwest Dade Junior High School in Florida to three standard bays and by repeating detail to cut concrete formwork costs, architect-engineers Matson and Deutschman of Miami held the overall cost to $9.42 per sq ft, $0.78 per cu ft, against a corresponding estimated cost of $12 and $0.99. In addition both equipment and materials were selected to reduce future maintenance costs.

The contractor, Thompson-Polizzi, of Coral Gables, in June bid 2% under his nearest competitor to take the job at $725,599. The owner furnished all reinforcing steel to bring the total cost up to $789,599.

This school will occupy a 20-acre site and have 83,924 sq ft of floor area in 40 classrooms, a library, auditorium, cafeteria, shops, band room, science rooms, arts and crafts and other facilities which will be used for community activities in addition to class work. The architectural cube is 1,010,100 cu ft.

Design features include three zones of activity: (1) classrooms, (2) special-purpose rooms, (3) group-use rooms. These occupy wings divided functionally along two main roofed-over corridors on which no rooms face. Thus disturbance from mass movement of pupils is reduced and travel distances are shortened.

The three standard bay widths are 46 ft, 29 ft and 23 ft.

The auditorium, band room, cafeteria and shops are in the 46-ft wing at the end of the covered corridors where they are readily accessible to both public and pupils.

Special rooms—food laboratory, clothing laboratory, science and physical education, arts and crafts are in the 29-ft wing. Regular classrooms, music and drama rooms and administrative offices are in the 23-ft bays.

Entirely of reinforced concrete construction, the 46-ft bays have rigid frames spaced on 12-ft 8-in centers with a continuous 5-in concrete slab roof deck.

For the other wings flat-slab construction varies from 5½ in at the ridge to 7 in at column bands, then tapers to 4 in at the overhang in the 23-ft bays. For the 29-ft bays corresponding slab thicknesses are 6½ in, 8 in, and 4 in. In both, columns are spaced on 15-ft 8-in centers.

Large windows on the north and high, small windows on the south provide good natural light and equalize light distribution. Projecting eaves, to control tropical glare, extend for 8 ft in the 23- and 29-ft wings and up to 16 ft for the high shop area.

Ventilation through low louvres at the breathing line of the pupils takes full advantage of the prevailing southeasterly breeze that averages 10 mph. Mechanical ventilation is provided for the cafeteria, auditorium and band room. Central heating is provided for all spaces.

Wood cabinet storage walls are used as room dividers with plaster, chalkboard, tack board and glass as other wall finishes. Ceilings are exposed concrete outside, acoustical material inside. Floor finishes include terrazzo, quarry tile, asphalt tile and cement.

James Garland, architect for the Dade County Board of Education, worked closely with the consulting architects and engineers.

Bidders include:

1C	Thompson-Polizzi, Coral Gables, Fla.	$725,599
2	Jefferson Constr. Co., Miami, Fla	743,000
5	Edw. M. Fleming Constr. Co., Miami, Fla	871,000

Area: 83.924 sq ft
Cost per sq ft (1C) $8 62
Total cost per sq ft including $64,000 reinf steel 9 42

Bids: 6-23-54 Item	Total cost	Total cost per sq ft
Bond & permit	$8,900	$.106
Clear & excavate	4,100	.049
Fill & topsoil	9,700	.115
Concrete	80,000	.955
Masonry	36,000	.430
Carpentry & labor	81,775	.975
Lumber & shoring	29,000	.346
Rough hardware & misc.	9,000	.108
Scaffolding	2,000	.024
Reinforcing rod	64,000*	.765*
Steel placing & mesh	39,300	.470
Aluminum awning windows	33,000	.395
Jalousies	12,000	.143
Toilet partitions & lockers	11,700	.140
Acoustical tile	18,000	.215
Paving	7,000	.084
Kitchen equipment	13,000	.155
Ventilation	7,400	.088
Refrigeration	1,200	.014
Electrical, public address, clocks	52,500	.628
Plumbing & heat—septic tanks	73,000	.870
Venetian blinds	470	.006
Chalk & tack board	5,000	.059
Finish hardware	5,700	.068
Tile, terrazzo, marble	16,000	.191
Roofing, sheet metal, waterproof	29,000	.345
Painting	20,000	.238
Metal doors & frames	900	.011
Skylights	2,850	.034
Modern fold doors	600	.007
Glass & glazing	2,800	.033
Plaster, stucco, lath	19,500	.232
Window shades, stage curtains	3,600	.043
Mill work	62,366	.745
Flooring	9,950	.118
Louvred ceiling	3,400	.040
Auditorium seating	6,300	.075
Instructors' desks	830	.010
Miscellaneous	7,758	.093

* owner furnished, incl here to get total cost

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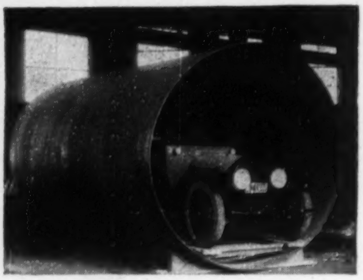


The pipe was farther along than the auto!

They made their automobiles high in the days when this photo was taken at the old Taylor Forge Works, and that's why Taylor Forge chose this way of demonstrating the largest heavy-walled pipe the world of 1916 had ever known.

As a matter of fact, the pipe was farther along than the automobile; for Taylor Forge had started the manufacture of this large pipe as early as 1907. Before then, pipe had been just a tube for conveying fluids, but by 1907 there was a widespread call for large, rated pipe to withstand widely varied and exacting services.

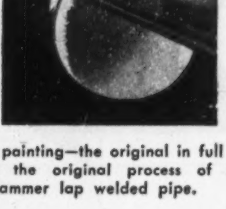
Taylor Forge responded to this call. In pioneering forged steel flanges, Taylor Forge had learned a lot about forging technique and piping practice...and both schoolings were prerequisite to the new venture. The projected large diameter pipe was to consist of heavy plate rolled into shape, then hammer lap welded to a smooth, sound weld. This called for heavy, specially designed equipment to make the process work and to provide the first *smooth interior* pipe and pressure vessel cylinders produced in this country.

Typical of the pioneering obstacles was the need for a clean flame to prevent scale forming at the weld, but this problem was solved when Mr. J. Hall Taylor designed and installed a large water gas plant that provided the desired welding conditions.

Thus it was that by 1916 Taylor Forge was making pipe up to 96"; forging all types of end joints on it; engineering it and prefabricating it into hydro-electric penstocks; laterals and Y's for pumping stations, pipe lines, and for similar applications all over the world.

Since the introduction of automatic metallic arc-welding this large pipe has been produced as "Taylor Straight Seam Electric-Weld Pipe," but there are hundreds of miles of the old "Taylor Hammer Lap Welded Pipe" still giving as good service as it did the day it was installed.

An episode in the story of Taylor Forge leadership in designed piping



This old painting—the original in full color—depicted the original process of making Taylor hammer lap welded pipe.

Where the highway dollar goes

With a $50-billion highway program in the process of being superimposed on top of the old outmoded $40-billion program, a look is in order at what these dollars buy.

Highways are not so simple as they look on the surface. If you doubt this, examine the list which follows of items that highway contractors had to bid on in a single year in only one state, New York.

Here are the prices that added up to $110 millions for state highway contracts and $250 millions for Thruway contracts let in 1953.

Contractors bidding on New York highways compete, not only with each other, but also with the engineer's estimates. If they can't meet or beat the latter, they don't bid, for New York awards no work on bids that exceed estimates.

But the engineers know what their average low bids are, on every class of construction, in each of their ten districts, and in addition they have weighted state averages.

The 1953 ranges shown here use only the high and low of the district weighted averages of these low bids, they omit the intermediate eight district bids. The average shown here is the weighted state average.

No district is consistently high or consistently low. For example District 1 (Albany) is high on 29 items, low on 19 and in between on 117 with 165 classes of work listed for 1953. District 10 (Long Island) is high on 67, low on 41 and in between on 144 with 252 different items bid.

In addition to these 1953 averages, unit prices on two 1954 projects are reported to show how current, individual project bids compare with these averages.

The 1954 bidding is the most competitive in years. At the August 19 letting nine jobs went for $19 million, 19% under the engineer's estimate. But, even in this cut-throat market, three projects, estimated at $2 million, drew no bidders—evidence that the engineer's estimates can be tough competition, too.

The 1954 unit prices shown are for Thruway construction through Yonkers and a section of the Major Deegan Expressway in New York City. They illustrate the variety of conditions highway engineers and contractors have to contend with in densely built-up areas.

This is a study in depth, to get a maximum in comparisons, by size, by type and by range.

These unit prices are what contractors are willing to be paid for the classes of work listed. But back of these units are the contractor's costs for labor and materials not bid on separately, and for insurance and other "invisible" costs. Take excavation or earthmoving, for example. The complex know-how, for estimating output and expense to arrive at the per-cubic-yard bid, is illustrated in an accompanying article in this issue on the economics and management of earthmoving machines.

This report on where the highway dollar goes in New York will be followed with another big report on the excellent cost and cost trend research by other states. This second installment on highway costs is now scheduled for the December 30 issue.

Clues to code

Unit prices are to the construction man what the double acrostic or the anagram crossword puzzle is to the puzzle fan — a challenge to his ingenuity and a test of his information in both breadth and depth.

Just to illustrate how puzzling they can get, here are a few clues to the code used here to define the materials and operations that go into construction:

CB	catch basin (drainage)
cb	cutback (asphalt)
CIP	cast iron pipe
cip	cast-in-place (piling)
CMP	corrugated metal pipe (drainage)
BC	bituminous concrete (pavement)
CC	cement concrete (pavement)
RCCP	reinforced concrete pipe (drainage)
HD	hot dipped (galvanized metal)
f&p, f&i	furnish and place (or install)
cr	crushed
crse	course
bk	brick
blk	block
rp cr	rapid cure
gd	guide rail
gr	grade
grd	graded
grtd	grouted
strt	straight

Standard abbreviations are used where possible, modified speedwriting where they leave off, after that you are on your own.

Where the highway dollar goes

Low bid prices in 1953, received by Department of Public Works, State of New York

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Compaction control bldg.	ea	$1,425.00	$1,086.38	$530.00
Cedar post salvg—trees 6" + butt, cut 8' lngth	ea	0.84	0.54	0.50[a]
Timber salv, 8"x8' + saw to 1" brds, remain property NY State	Mfbm	47.32	46.35	42.76
Applying water	Mgal	2.75	2.04	1.30
Exc, uncl, w moist cont.	cy	1.16	0.88	0.56
without moist control	cy	1.15	0.73	0.60
incl overhaul	cy	1.45	0.68	0.62
Embankment, in place	cy	......	0.92	......
Embank, sel granlr in pl.	cy	......	3.07	......
Borrow, selected	cy	1.75	1.09	1.00
Exc, trench, culv, br	cy	4.99	4.01	2.48
w fill to subgr bef exc	cy	......	4.73	......
Overhaul	stay	0.0104	0.0021	0.001
Trim rd sect				
Thruway only	lfrd	0.91	0.73	0.42
Other	lfrd	1.00	0.47	0.31
Trimming road sect.	sy	0.10	0.046	0.045[b]
Preparing fine grade	sy	0.36	0.31	0.23
Preparing fine grade	sy	0.35	0.30	0.26
Drainage				
Sewer pipe conc or vit				
4"	lf	......	1.00	......
6"	lf	1.55	1.10	0.90*
8"	lf	2.25*	1.86*	1.00*
10"	lf	......	1.60	......
12"	lf	4.00	2.70	2.66
15"	lf	3.60	3.54	3.28
18"	lf	4.76	4.45	4.42
21"	lf	......	6.39	......
24"	lf	8.00	7.59	6.99
30"	lf	12.00	11.74	11.50
36"	lf	......	12.00	......
Sewer pipe conc				
6"	lf	......	1.50	......
12"	lf	......	3.44	......
15"	lf	......	4.57	......
18"	lf	......	6.50	......
21"	lf	......	7.50	......
24"	lf	......	7.00	......
30"	lf	12.30	11.94	10.00
Sewer VP SS ASTM C-13:				
4"	lf	......	1.50	......
6"	lf	......	2.00	......
8"	lf	......	2.50	......
10"	lf	3.75	3.06	3.00
12"	lf	3.80	3.26	2.50
15"	lf	5.28	5.06	4.00
21"	lf	......	6.50	......
24"	lf	......	15.00*	......
Sewer VP ES ASTM C-200:				
6"	lf	2.00	1.80	1.50
8"	lf	2.20	1.47	1.45[c]
10"	lf	3.45	2.74	2.00
12"	lf	4.00	2.83	2.50
15"	lf	5.90	4.79	4.68
18"	lf	7.00	5.75	5.00
20"	lf	......	9.99	......
24"	lf	12.00	9.22	8.50
VCP undrdr ES ASTM C-200 6"	lf	1.87	1.57	1.00
8"	lf	3.00	2.29	1.50
10"	lf	......	3.04	......
12"	lf	......	4.00	......
Perf VCP underdrain 6"	lf	1.75*	1.08	1.06
VCP undrdr, SS ASTM C-13				
4"	lf	......	0.98	......
6"	lf	1.50	1.22	1.00
8"	lf	......	1.15*	......
Pipe underdrain, opt 4"	lf	1.39	0.88	0.73
6"	lf	1.44	1.28	0.60
8"	lf	......	1.50	......
12"	lf	2.50	2.16	2.15
CMP galv & bit ct 6"	lf	......	2.57	......
8"	lf	3.00*	2.56*	2.00
10"	lf	......	......	......
12"	lf	4.86	4.52	4.00*
18"	lf	6.50	4.93	4.50
24"	lf	9.00	8.50	6.97
14 ga 30"	lf	12.00*	8.39	8.00
36"	lf	......	12.00	......
42"	lf	16.00	15.73	14.00
12 ga 48"	lf	25.00	20.93	16.00
Oblate CMP ½" corr glv & bit ct span rise ga				
14" 9" 16	lf	5.00	4.54	4.53
18" 11" 16	lf	......	4.00	......
29" 18" 14	lf	......	10.00	......
36" 22" 14	lf	......	11.00	......
58" 36" 12	lf	30.00	27.81	27.00
72" 44" 10	lf	50.00	36.26	30.00
Perf MP underdrain				
6"	lf	2.00	1.71	1.18
8"	lf	3.00	2.85	2.80
12"	lf	4.00	3.29	3.00
Met hdwall for cor' p'pe				
culv 12 ga 24"φ	lf	58.00	52.50	50.00
culv 10 ga 30"φ	lf	100.00	97.80	80.00

† District (1 of 10) ‡ state-wide * small quantities in contract [a] 40,000 posts [b] incl 1 cont of 974,000 sy @ $0.04/sy [c] incl 1 cont of 6,950 lf @$1.20/lf

Continued on following page

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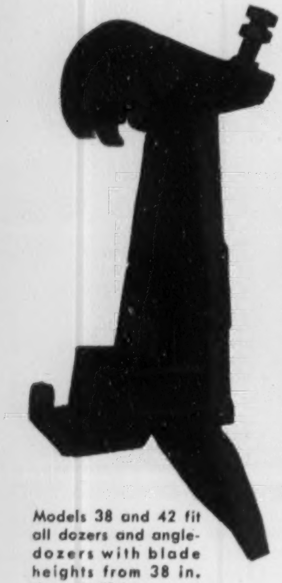
to fit all makes and models of dozers and angledozers...



Models 38 and 42 fit all dozers and angledozers with blade heights from 38 in. through 50 in.

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Put one on your tractor and watch it rip and root its way through concrete, asphalt, lava rock, hardpan, boulders. An *ESCO* Dozer Rooter outperforms a cumbersome drawbar ripper. Yet, it's portable enough to carry on the tractor or in a pickup truck from job to job.

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Models 26 and 32 fit all dozers and angledozers with blade heights from 26 in. through 37 in.

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712 PORTER ST., DANVILLE, ILL.

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Continued from preceding page

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Pav inv CMP culv galv & bit ct				
12" 16 ga........	lf	4.00	3.64	3.60
18" 16 ga........	lf	6.86	5.36	5.00
24" 14 ga........	lf	10.00	9.00	6.25
26" 14 ga........	lf	......	10.50*	......
30" 14 ga........	lf	15.00*	10.84	8.00
36" 12 ga........	lf	14.00	13.16	12.70
42" 12 ga........	lf	19.00	17.77	15.00
48" 12 ga........	lf	......	18.48	......
54" 12 ga........	lf	......	18.50	......
60" 10 ga........	lf	30.00*	24.26	24.00
72" 10 ga........	lf	......	40.00	......
Pav inv CM elbws				
18" 16 ga........	ea	......	28.65	......
24" 14 ga........	ea	......	58.33	......
CMP-hvy, g&bc 12".	lf	5.12	4.74	4.00
15".	lf	6.85	5.95	5.04
18".	lf	7.83	6.69	5.27
24".	lf	12.16	10.04	7.96
30".	lf	19.00	16.16	12.00
36".	lf	18.45	17.84	15.82
42".	lf	......	20.00	......
48".	lf	25.00	24.84	24.00
54".	lf	......	35.00	......
60".	lf	40.00	37.58	30.00
Galv corr plt P 6x2" corr				
60" 10 ga........	lf	......	40.00	......
60" 7 ga av........	lf	......	45.00	......
72" 8 ga........	lf	......	34.00	......
84" 12 ga........	lf	......	56.15	......
84" 10 ga........	lf	......	48.00	......
84" 8 ga........	lf	......	60.00	......
84" 1 ga........	lf	......	70.00	......
96" 5 ga........	lf	......	75.00	......
96" 4 ga, av........	lf	......	80.00	......
96" 1 ga........	lf	......	90.00	......
102" 10 ga........	lf	......	47.00*	......
108" 12 ga........	lf	......	75.00	......
108" 10 ga........	lf	......	50.00*	......
120" 10 ga........	lf	75.00	66.62	52.00
132" 7 ga........	lf	......	69.00	......
144" 8 ga........	lf	......	120.00	......
144" 1 ga........	lf	......	125.00	......
Oblate				
spn 5'10" rse 6' 6" ga 8[d]	lf	......	55.00	......
5'10" 6' 6" 10[d]	lf	......	50.00	......
6' 5" 4' 9" 12	lf	......	40.00	......
9' 5" 6' 6" 10	lf	......	66.61	......
11' 5" 7' 3" 7	lf	......	68.18	......
12' 6" 7'11" 7	lf	......	100.00	......
12'10" 8' 4" 5	lf	......	74.00	......
13' 4" 8' 5" 5	lf	......	85.00	......
arches				
spn 8'0" rse 3'0" ga 12	lf	......	26.00	......
16'0" 10'2" 1	lf	......	125.00	......
CIP, 4"............	lf	......	3.73	......
6"............	lf	4.92	4.77	4.65
8"............	lf	6.59	5.78	5.55
10"............	lf	8.00	7.00	5.00
12"............	lf	10.00	8.19	6.23
16"............	lf	10.00	8.95	8.33
18"............	lf	12.00	10.03	10.00
20"............	lf	......	11.42	......
24"............	lf	25.43	22.30	15.00
30"............	lf	50.00	39.08	25.00
36"............	lf	48.00	41.85	35.00
RCCP, 12"............	lf	4.92	4.14	3.15
15"............	lf	6.16	4.42	4.04
18"............	lf	7.60	6.18	4.59
21"............	lf	......	7.60	......
24"............	lf	10.75	8.84	6.73[e]
30"............	lf	13.21	12.32	9.82
36"............	lf	16.15	14.81	14.05
42"............	lf	20.00	18.93	15.00
48"............	lf	25.00	23.37	21.61
54"............	lf	39.00	27.89	23.31
60"............	lf	34.81	32.43	27.62
66"............	lf	42.00	33.23	32.13
72"............	lf	50.00	48.27	36.00
84"............	lf	65.00	60.40	60.00
96"............	lf	......	100.00	......
Reinf conc cattle pass 4x6'............	lf	66.25	49.15	45.00
Subaq RCCP with groutd rubber stl jts 96"ϕ..	lf	......	150.00	......
RC sewer pipe, 12"....	lf	5.20	3.76	3.20
15"....	lf	5.60	4.70	4.09
18"....	lf	5.99	5.96	5.00
24"....	lf	9.00	7.83	7.75
30"....	lf	12.20	11.63	11.29
36"....	lf	15.00	13.29	12.50
42"....	lf	......	18.85	......
48"....	lf	38.17	27.73	20.00
Spec perf RCCP, circ reinf #6, 4"c-c, longit reinf #7 wire 8"c-c, 2" wall, 15"ϕ.......	lf	......	4.95	......
2" 18"........	lf	......	5.21	......
3" 24"........	lf	......	7.00	......
Spec perf RCCP, circ reinf #4,2"c-c, longit reinf #7 wire 8"c-c, 3½" wall 30"ϕ....	lf	......	9.00	......
Spec RCCP ASTM-C-76, T2, ES place by jack, open-cut or undrpn thru RR emb, 66" (exc pd separately)	lf	......	100.00	......

[d] sp obl shape [e] incl 1 cont of 3,368 lf @$6.60/lf

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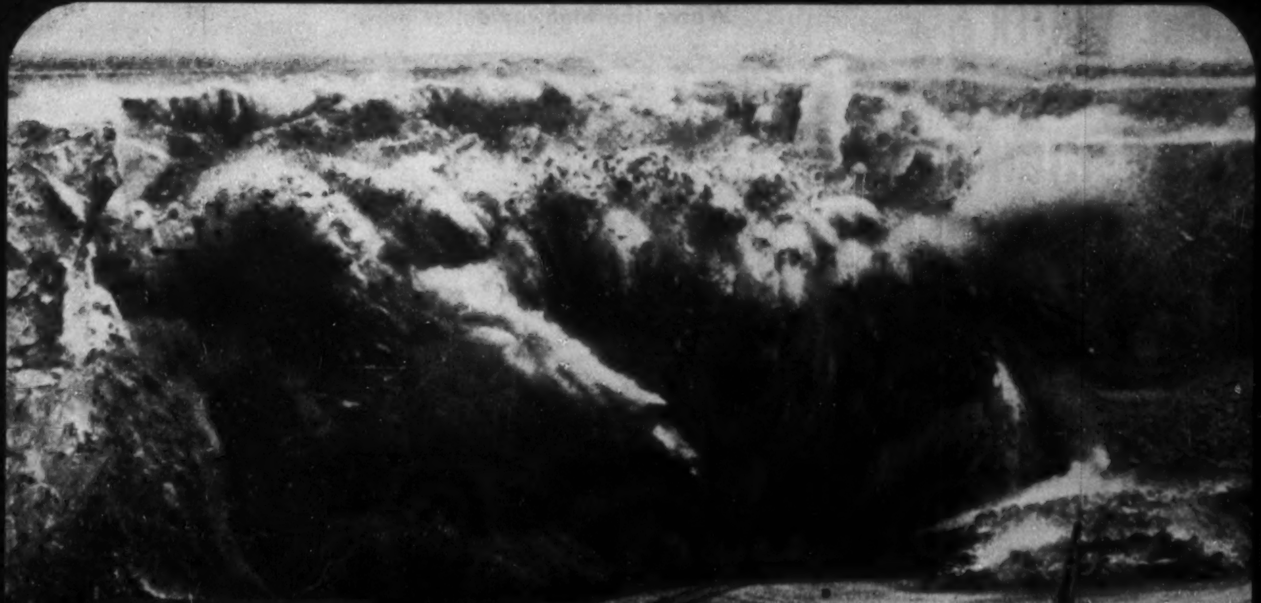

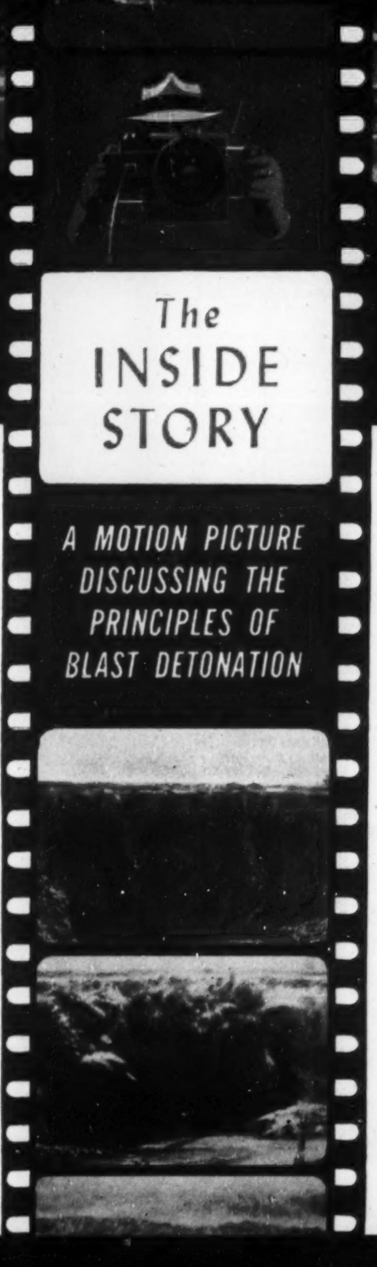

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. . . Where the highway dollar goes

Continued from preceding page

Cement and concrete

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Portland cmt, type 1	bbl	......	4.44	......
1A	bbl	......	3.94	......
2	bbl	5.00	4.34	4.04
2A	bbl	4.96	4.39	4.00
Portland cmt, type 2-NY specs M-1, max 8% tricalcium aluminate	bbl	......	5.39	......
Portland cmt, type 3	bbl	5.04	4.68	4.00
3-NY spx M-1 above	bbl	......	6.00*	......
Portland cmt, 6A	bbl	11.00	9.97	9.92
6A spec	bbl	12.00	9.48	9.43
1 spec	bbl	5.00	4.47	4.25
1A spec	bbl	5.30	4.33	4.24
Daragg pozzolan	bbl	......	5.00	......
Portland cmt, type N	bbl	5.08	4.37	4.25
Calcium chloride, furn.	ton	......	55.00	......
Furn & apply calc chlor	ton	68.40	59.28	44.57
Conc, cl 1A struct	cy	66.02	57.92	44.94
for shaft lining	cy	......	63.00	......
for tunnel lining	cy	......	65.57	......
1A, pile, cap-slab, bents, columns, beams Tappan Zee bridge[f]	cy	......	87.55	......
1A railing	cy	154.96	137.91	108.04
cl 1	cy	59.82	46.18	36.65
2	cy	60.67*	46.17	29.35
3	cy	41.03*	30.87	29.89
Msry, stone	cy	182.68	153.90	138.04
dimension	cy	345.23	331.90	267.65
stone, granite, or gneiss av thick 10-12"	facesf	......	4.34	......
dimen, granite or gneiss pd for exposed surf	facesf	......	8.47	......
stone, gran or gns	cy	......	112.46	......
dimen, gran or gns	cy	500.00*	348.74	345.70
rubble, stone	cy	......	59.36	......
Bagged, screened gravel	cy	......	12.00	......
Bag, scrnd grav or slag	cy	......	16.50	......
Rubble stone msry ld dry	cy	60.00	50.97	26.00
Met reinf for conc pvmt	sypv	0.95	0.76	0.70
Stl fabr reinf 6x6" #6wire	sy	1.00	0.74	0.67
4x4" #14	sy	......	1.00	......
4x4" #6	sy	......	0.72	......
Stl fabr or bar mats	sypv	......	0.89	......
Met reinf for conc pvmt, std struct sht	sypv	0.81	0.74	0.65
Bar reinf for conc pvmt	lb	0.20*	0.141	0.134
Longit jt suppt, curbs	ea	1.19*	0.75	0.60
Long jt suppt	ea	1.00	0.80	0.75
Transvers jt suppt	lfjt	2.00*	1.69	1.58
Trans-load contract jt per std str sht52-20A or 1¼"φx1'6" dowels 12" c-c supptd by 6"x⅛" vert plt; cut jts approx ¼"x1¾" dp spcd per std sh 52-3A	lfjt	......	1.68	......
Trans-load contr jt std str sh 52-20A, 52-3A	lfjt	......	1.46	......
Bar reinf, structs	lb	0.16	0.139	0.122
Spiral bar shear connrs	lb	1.08	0.82	0.73
Bar reinf, structs confrm to defrm bars ASTM A305-50T-TappanZeeBr	lb	......	0.179	......

Structural steel

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Str stl mostly I-beam	lb	0.203	0.168	0.13
most plt girder or trusses	lb	0.229[g]	0.215[g]	0.17
above combined	lb	......	0.187[g]	......
Cast steel	lb	0.70	0.52	0.42
Silicon stl plt-girders & trusses ASTM-A94-29T	lb	0.28[h]	0.241	0.24
Misc metals	lb	0.48	0.270	0.212
Spec steel gratg 1-piece welded const	lb	......	0.50	......
Abrasive stair tread	sf	......	5.00	......
Pile shoes	ea	......	15.00	......

Guide rails

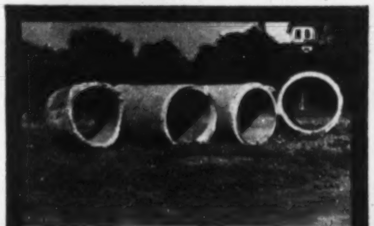
Items: 1953 lettings	Unit	High†	Aver‡	Low†
Cable gd rail, conc post	lf	2.88	2.85	2.85
wood, RR rail, or conc posts	lf	3.51	2.82	2.50
Reset cable gd rl	lf	1.90	1.51	1.37
Beam-typ gd rail, RR posts	lf	......	2.77	......
wd RR rail or conc posts	lf	2.99	2.79	2.64
Guide posts, wood	ea	10.00	9.99	9.98
reinf conc	ea	10.00	9.98	9.56
wood or conc	ea	10.00	9.03	8.08
Resetting guide posts	ea	5.80	3.42	2.00*
Rustic timb guide rail, high Posts 7-8"φ smll end Top rl 6-8"φ peeled blak locust; low rl 3 × 8" tr yellow pine or Doug fir	lf	......	3.26	......
Rustic timb guide rail, low Tr posts; stained peeled locust cypress, red oak, 10"φrl	lf	......	10.00	......
Timb guide rail, low yellow hard locust, posts 9-11"φbefr slabg, 1 rail 3x6" or 3x8"	lf	6.49	3.29	2.23
high, black or yel hard locust, posts 9-10"φ,2 rls 3x6"	lf	......	3.93	......
Tubular met rail-std struct sht 44-32R-BR; 3-rail	lf	16.00*	15.24	13.40
4-rail	lf	18.40	14.85	14.08
Met rail, 3 4x⅝", posts 4x¾", 3'0" long 1'6" c-c	lf	......	19.65[i]	......

Roadway base and surface

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Fndn crse; ROB grav	cy	2.93*	1.87	1.83
ROB grav loose meas	cy	2.50	1.91	1.08
limestn scrng	cy	....	6.65	....
grav	cy	4.00	1.85	1.18
grav 39R or stone screen	cy	......	2.17	......
broken slag orstone	cy	......	5.50	......
broken stone	cy	8.00	7.00	6.25
Bottom crse broken stone	cy	10.00	7.12	6.03
broken stone, loose meas	t	6.92	5.73	4.69
bit mac pen method asph	cy	10.00	8.10	6.37
asph	t	6.34	5.07	4.50
Bottom crse, bit mac pen meth, asph. 1S, 2&3 or 3A stone flld w No. 1S, 1 & 1A stone; no sand or screenings	t	......	5.67	......
Conc fdn, pvmt	cy	16.89*	11.23	10.49
CC pvmt, 1:1¾:3½	cy	16.43	12.32	11.00
bridge	cy	33.39	25.02	20.95
unreinf	cy	......	13.55	......
carbon black	cy	14.91	12.92	12.37
bridge	cy	......	25.00	......
no exp jt, contract jts 40' c-c	cy	13.00	12.73	12.66
CC pvmt, 1:1:2½	cy	......	16.70	......
carbon black	cy	......	15.00	......
no exp jt, contract jts 40' c-c	cy	......	13.00	......
2 crse CC pvmt	cy	......	11.00	......
Asph conc; opt mix meth, 1 crse	t	12.50	12.43	10.00
1A opt mix, 2 crse	t	11.62	10.82	8.73
1A opt levelg crse	t	......	11.87	......
1A opt patch, level, wedges & evener	t	10.43	8.39	7.35
1A opt coarse mix only, widening	t	......	9.21	......
1A opt, heatd screed finish, broken slg aggr incr asph contnt 25%	t	......	8.26	......
1A opt 1 crse, 1" th	sy	......	0.60	......
2A stone-fill sht asph, hot mix 2-crse	t	12.56	11.15	10.48
Plus heated screed	t	......	15.00	......
Top crse grd grav; bit mulch	cy	......	7.00	......
bit double surf treat.	cy	6.22	5.45	4.50
Same except waive ABC grav, add matl passg #200 sieve up to 3% min, 5% max	cy	......	4.62	......
Top-crse bit mac; Type 1 pen hot asph.	cy	11.00	9.74	7.46
Type 2 pen asph emuls	cy	......	8.00	......
Brick pvmt.	sy	......	10.00	......
Top-crse grd gravl	cy	4.00	3.90	3.50
Treat with bit matl	gal	0.35	0.227	0.19[j]
Treat with tar	gal	......	0.25	......
Bit matl A, cutback, or emuls or T road tar	gal	1.48	1.24	0.98
Membr waterproofg	sy	3.35	1.89	1.78
Prot crse for membr watrprf, reinf mortar	sy	6.42*	2.46	2.13
½" th asph tile	sy	......	3.37	......
Bit matl A, pavg asph Gr 85-100, H&C laid pl mx	gal	0.20	0.191	0.183
Gr100-120, pen const.	gal	0.277	0.184	0.165
Bit matl rp cure asph cb RC-5, plt mx seal	gal	......	0.15	......
Bit matl A, MC liq asph; Gr MC-0, primer	gal	......	0.20	......
MC-1 light surf tr	gal	......	0.25	......
incl blotter crse of 1A stone @ 25#/syMC2	gal	......	0.316	......
Bit matl A,rp cr asph cb; incl 1A stone blotter crse @25#/sy	gal	......	0.321	......
RC1, surf treatment	gal	......	0.181	......

*[f] conc poured in dry; suspended slb frms. Fine aggr, cowbay sand A or B; crse aggr, cr Haverstraw traprock A or B & cr grav A or B *[g] not incl cont of 57,735,000 lbs@$0.3074/lb Tappan Zee bri *[h] not incl cont of 28,680,000 lbs@$0.3646/lb, Tappan Zee bri *[i] 27,260 lf rail in 3 cont, Tappan Zee bri *[j] 10,900 gal in cont

Continued on following page



Sections removed from 27 year old Riverside pipeline to accommodate new pumping system.

A PIPELINE–27 YEARS OLD AND BETTER THAN EVER!

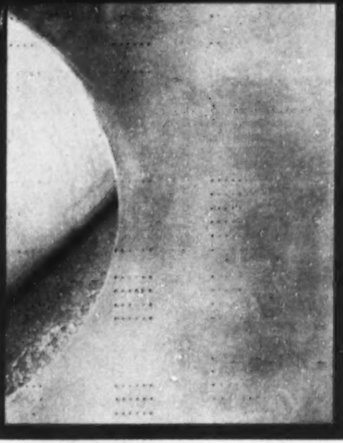
Increased efficiency of American Reinforced Concrete Pressure Pipe is saving $$$ for Riverside

Riverside, California water works engineers devised a method for meeting rising peak water demands by increasing the capacity of a 27-year old reinforced concrete pipe line. The 7-mile 42″ gravity line was, and is, a main unit of the city's water supply system. Several sections of pipe were removed to make room for an ingenious vacuum booster system devised by the Riverside men. The centrifugally spun pipe sections, manufactured by American in 1927 and installed with collared joints, were found to be in excellent condition. The steel reinforcement was bright and untarnished, the rugged concrete had improved with age. The interior walls were extremely smooth.

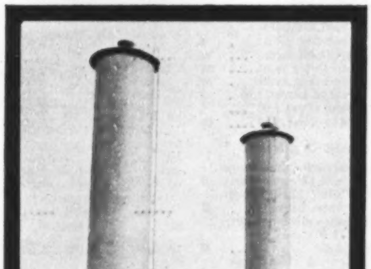
Flow tests conducted earlier had revealed an *increase* in hydraulic efficiency (C=140; Hazen-Williams Formula) since the line was installed. Here again is the proof that you can design for a high sustained hydraulic capacity and thereby gain years of extra protection against foreseen and unforeseen increases in demands for water.

The excellent condition of this pipe enabled the Riverside engineers to install their vacuum system and eliminate the need for a parallel line. This resulted in an estimated saving of $650,000.00 to the taxpayers and for many years to come they can enjoy the benefits of a water supply line with costs long since amortized.

The use of American Reinforced Concrete Pressure Pipe in municipal water systems is insurance against large future outlays for repairs, maintenance and high pumping costs. Help on *your* project from our sales engineers and bulletins on American's pressure and non-pressure pipe products are yours for the asking. Write or phone for complete information.



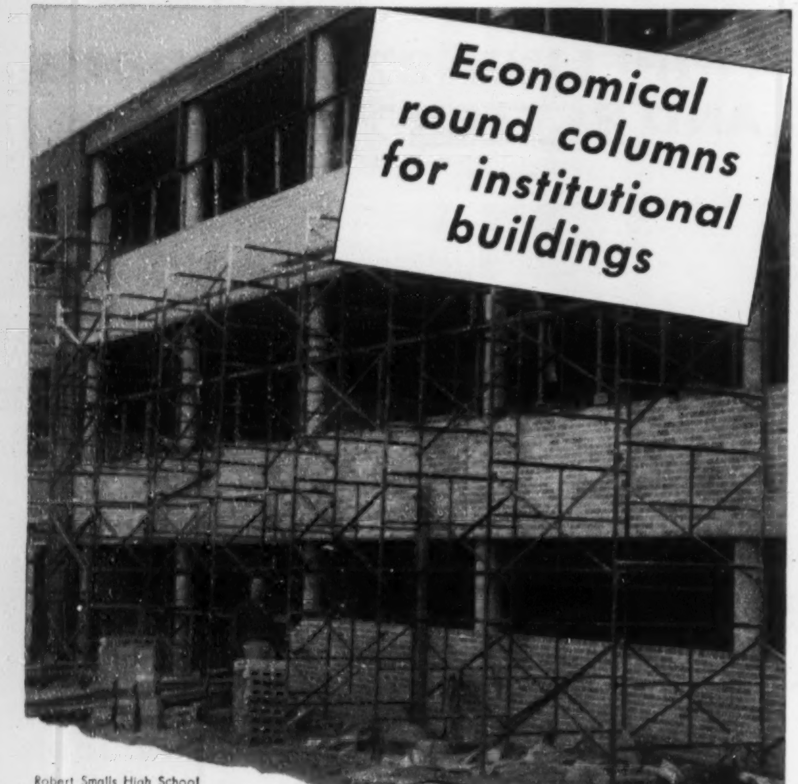
Unretouched photo of pipe section after 27 years in the ground. Note smooth interior wall.



Surge tanks at booster station. Automatic controls actuate pump according to water level at intake reservoir weir 7 miles away.

American
PIPE AND CONSTRUCTION CO.

Main Offices and Plant: 4635 Firestone Blvd., South Gate, California
District Sales Offices and Plants: Hayward • San Diego • Portland, Ore.
Concrete pipe for main water supply lines, storm and sanitary sewers, subaqueous pipe lines



Robert Smalls High School
Beaufort, S. C.
Young Lumber Co.,
General Contractor
Heyward Singley, Architect

Sonotube®

FIBRE FORMS

for round columns of concrete

The use of SONOTUBE Fibre Forms to form the round concrete columns in the construction of this school illustrates one of the many ways SONOTUBES can save time, money and labor.

Low cost SONOTUBES are lightweight and easy to handle . . . require minimum bracing. For all types of institutional building . . . schools, churches, hospitals . . . and for other type structures as well, SONOTUBES provide a fast, economical method of forming round columns of concrete.

Approved by architects and engineers, widely used by contractors everywhere.

In 31 sizes, from 1″ to 36″ I.D. up to 50′ long. Can be ordered in specified lengths or sawed to your requirements on the job.

DENFORM
capital form
designed for
use with
SONOTUBES
Write for
details.

See our catalog in Sweet's

For complete technical data and prices, write

SONOCO PRODUCTS COMPANY
Construction Products Division
LOS ANGELES, CAL.
HARTSVILLE, S. C. — MAIN PLANT
MONTCLAIR, N. J.
AKRON, IND.
BRANTFORD, ONT.

SONOCO
SERVES THE WORLD
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. . . Highway Dollar

Continued from preceding page

Items: 1953 lettings	Unit	High†	Aver‡	Low†
RC3, mild weath rd mx	gal	......	0.100[k]	......
Bit matl A, asph emuls	gal	......	0.25	......
Bit matl T road tar, for:				
surf treat & road mix	gal	......	0.25	......
surf treat, road mx, pre-mix & seal coat	gal	0.282	0.246	0.21
prime coat, light surf	gal	0.30	0.257	0.20
incl blotter crse of limest scrn @20#/sy	gal	......	0.25	......
Stone fill	cy	8.50	7.77	2.51
Stn fill 70% over 400#, other over 100# ea	ton	......	11.05	......
Hvy stn fill, 75% of stn ¼–¾ cy ea	cy	......	2.50[l]	......
Dry stone paving	sy	10.00	5.83	5.39
Dry rip-rap	cy	18.76	13.70	12.22
Grtd rip-rap	cy	25.54	18.73	16.85
Stn bank prot stn unhwn quarry, 75% 100-1500# ea	cy	......	5.48	......
Cofferdams & piling				
Cofferdams	sf	3.04	2.25	0.50
Stl sht piling, perm				
B AP3 or C MP115 36.0#/lf 22#/sf	sf	5.04	3.33	2.69
C MP112 30.7 23	sf	4.44	4.08	4.00
B DP2 36.0 27	sf	......	4.00	......
B AP8 38.8 31	sf	......	6.00	......
B ZP38 57.0 38	sf	......	4.60	......
Stl sht piling, temp				
B AP3 36.0 /lf 22#/sf	sf	......	1.50	......
C MP112 30.7 23	sf	2.91	2.62	2.54
B AP8 38.8 31	sf	......	4.00	......
B DP1 42.7 32	sf	......	1.00*	......
C MP116 36.0 27	sf	......	2.00	......
Timb sht piling, perm	sf	2.00	1.24	1.16
temp	sf	1.00	0.64	0.50
Timb piles, creosotd	lf	3.47	3.37	1.75
creosotd test	lf	12.50	7.99	7.00
untreated	lf	2.50	2.32	1.50
untrtd test	lf	12.76	7.97	2.00
Steel bearing piles				
8″ BP @36#	lf	......	3.00	......
10″ @42#	lf	6.18	5.47	3.70
10″ @57#	lf	8.00	5.45	4.00
12″ @53#	lf	6.84	5.30	4.50
14″ @73#	lf	9.00	6.47	6.00
14″ @89#	lf	......	11.00	......
Steel bearing test piles				
8″ BP @36#	lf	......	8.00	......
10″ @57#	lf	......	9.00	......
12″ @53#	lf	......	10.00	......
14″ @73#	lf	......	10.00	......
cip conc piles const-dia open end				
10″φx⅜″ shell	lf	11.00	7.76	6.90
12″ x$\frac{5}{16}$″ min	lf	8.83	5.94	4.66
12¾″ x½″	lf	......	10.00	......
24″ x½″	lf	......	30.00	......
30″ ½″	lf	......	60.00[m]	......
cip conc piles closd end				
10″ constφx⅜″ shell	lf	......	7.77[n]	......
12″ x½	lf	......	8.77[n]	......
14″ x½	lf	......	8.50[o]	......
16″ x$\frac{7}{16}$″	lf	......	11.00[o]	......
cip conc piles tapered closed end				
8″ tip, #16 gage	lf	......	5.44[p]	......
cip conc test piles open end, 12″φx$\frac{5}{16}$″	lf	17.15	14.21	12.50
Remove bit carpet	sy	......	0.46	......
Clean existg pvmt	mi	238.72	139.84	66.29
Clean existg pvmt	sy	0.14	0.12	0.05
Screened gravel, LM	cy	6.54	5.16	4.02
Broken stone, LM	t	6.50*	5.86*	3.80*
Broken stone, LM	cy	6.75	6.47	5.00
Curbs & gutters				
Stone curb & headers;				
5″x15-17″, grav fndn	lf	6.00	5.10	5.00
5″x16″, 12x16″ conc fndn, backg	lf	......	5.83[q]	......
Granite curb & headers				
Strt 5″x15-17″grav fndn	lf	6.00	5.08	3.50
Circ 5″x15-17″grav fndn	lf	6.50	6.00	5.65
Strt 5x12″ on bri slab doweld to conc	lf	......	8.00	......
Strt 5″x15-17″incl conc fndn & backg, tile & porous matl	lf	7.95[q]	6.70[q]	6.50[q]
Gran curb slopd 2;1, 3-6″x11-13″ tampd grav fndn matl pd separate	lf	......	4.07	......

[k] 850,000 gal in cont [l] 35,000 cy in cont [m] incl cost furn drivg equip & conc (cmt & reinf paid separately) [n] incl spher cast-stl point (conc, cmt, bar-reinf & furn equip paid separately) [o] incl spher cast-stl pnt & conc (cmt & furn equip paid separately) [p] conc, cmt, bar-reinf & furn equip paid separately [q] cmt & exc pd separ

Continued on following page

. . . Highway dollar

Continued from preceding page

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Granite curb				
Inlets, strt, grav fndn	ea	......	37.66	......
circ, grav fndn	ea	......	41.67	......
Drivewy transition				
2′ sect grav fndn..	ea	......	15.00	......
incl conc fndn, backg, porous mtl	ea	......	15.00[a]	......
Circ, 5″x15-17″ incl conc fndn & backg, porous mtl.......	lf	......	7.50[e]	.....
Drive, 5x11½″, conc fndn, porous mtl				
strt...............	lf	......	7.00[a]	.....
circ, incl backg...	lf	......	8.50[a]	.....
Reset curb, grav fndn cl 2 conc, incl f&p backg, porous matl, 3″ tile..........	lf	4.43 5.00[a]	3.23 4.15[a]	2.00 3.00[a]
Conc curb; gravl fndn, doweld to pvmt & cont keyway pvmt opt				
Unmountable gray cmt 6-10″x15-24″...	lf	4.00[a]	2.17[a]	1.68[a]
Unmntble, white cmt top 6-8¼″x13-21″...........	lf	2.46[a]	1.28[a]	1.23[ar]
Mntble gray cmt 7-12″x12-15″...	lf	1.90[a]	1.48[a]	1.38[a]
Mntble white cmt top 7-12″x11-14″...	lf	......	0.96[a]	.....
Conc, curb, steel faced:				
12″x18″, 9″x⅜″ bent plt 2″x⅜″ flat anchors 2′ c-c..	lf	......	6.00	......
9″x18,″ 7″x⅜″ bulb angle 2x⅜″ flat anchors 2′ c-c....	lf	......	7.00	......
Reflectg conc curb 9″x9-13½″, white cmt top mntble.....		2.00	0.90	0.90
Reflectg conc mall 4′x10½″-13½″, white cmt top mntble, no fndn or cmt incl....	lf	......	5.00	......
Conc gutters..........	sy	7.29*	5.40	5.00
Bit gutter 4′x6″ ;375#-#2 & #3 stone compc 6″, 1 gal/sy penetr & ¾ gal/sy seal ct bit matl A (bit matl pd separately).........	sy	......	4.00	......
Conc curb & gutter: slab 2′3″-2′7″x6-7″, curb 7x8″, incl porous matl & 4″ B&S drain tile................	lf	3.33	2.50	2.50
Cobble gutter.........	sy	6.14	5.83	4.75
Catch basins, mnhls, drop inlets.........	cy	101.64	78.13	51.90
CB's, DI's, MH's to 6′ h, conc or c blk 8″ walls, 8″ conc flr (cmt, exc, frame, grate pd separtly CB's 24x36″ inside.............	ea	......	167.68	......
42x48″	ea	......	211.88	......
DI's 22x36″ inside..	ea	......	246.65	......
36x36″	ea	......	173.78	......
24x48″	ea	......	168.38	......
60x60″	ea	......	400.00	......
Field inlt 36″ ID....	ea	......	150.00	......
MH's 36″φ.........	ea	......	200.00	......
San 48x48″, 12″ flr	ea	350.00	199.29	164...
48″φ, 12″ flr..	ea	......	214.81	25
Extra depth for CB's, DI's FI's and MH's, abv 6′ overall incl base	lf	......	40.67	......
Altering MH's & CB's	ea	68.41	44.07	39.16
masonry only.......	ea	......	60.00	......
Salvg, store, reset existing castgs......	ea	100.00	41.62	40.57
ROW markers, opt....	ea	10.00	9.24	8.42
Granite ROW markers	ea	8.20	8.08	8.00
Conc ROW markers—				
high...............	ea	10.95	10.29	10.20
low................	ea	10.00	8.47	8.27
Conc sidewalk—6″....	sy	6.00	4.79	3.62
no reinf mesh—6″...	sy	5.50	4.76	4.76
4″ except 8″ drive, no reinf, incl 4″ cind or grav..........	cy	37.00	28.06	26.61
6″, 8″ drv incl reinf mesh..............	cy	......	40.00	......

Fencing

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Fencing...............	lf	......	1.10	......
ChLk fnce 2″ mesh #9ga wire coppr bearg stl opt, galv aft weavg, rls & posts galv stl P or galv rld sect (conc fndn posts not incl)				
Fence 4′..........	lf	4.00	2.00	1.94
6′..........	lf	4.11	4.07	......
7′..........	lf	......	4.50	......
8′..........	lf	......	5.38	......
10′..........	lf	......	8.00	......
12′..........	lf	......	8.00	......
16′..........	lf	......	11.00	......

*[a] cmt & exc paid separ *[e] *[r] 1 cont of 7,200 lf@$1.09/lf

Continued on following page

Precast
concrete frame
speeds
construction

Warehouse, Great Lakes Naval Training Station
Corbetta Construction Co., Contractors
A. Amirikian, Chief Design Engineer

SONOVOID

FIBRE TUBES

for voids in concrete construction

SONOVOID Fibre Tubes of 10 and 12 inch diameter were used to create voids in the precast concrete frame of the warehouse at the Great Lakes Naval Training Station.

The structure consists of ribbed panels for the walls and roof and hollow concrete sections for the rigid frame. This type of construction resulted in considerable savings in job-time and concrete.

Easy to handle, low cost SONOVOID Fibre Tubes are specifically developed for prestressed and poststressed precast units or units cast in place. For concrete bridge deck, wall, floor and roof slabs.

SONOVOIDS save concrete and reinforcing steel without impairing structural strength.

Supplied in specified lengths or sawed to your requirements on the job. Sizes 2″ to 36.9″ O.D. up to 50′ long. End closures factory applied or supplied separately.

See our catalog in Sweet's

For complete technical data and prices, write

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Construction Products Division
LOS ANGELES, CAL.
HARTSVILLE, S. C. — MAIN PLANT
MONTCLAIR, N. J.
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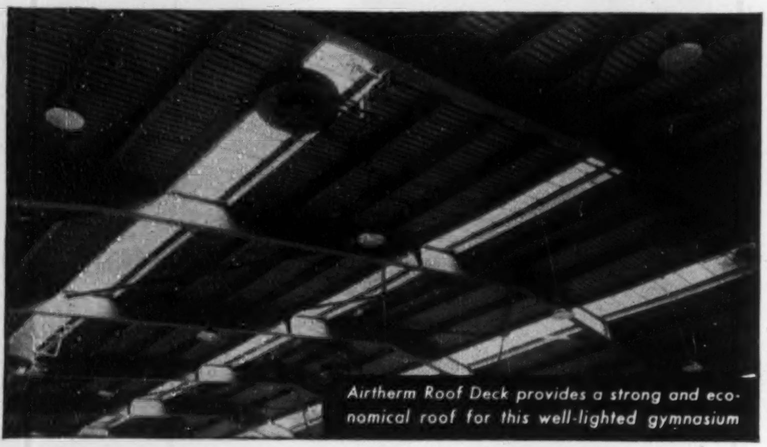
WIDER *Airtherm* ROOF DECK



Airtherm Roof Deck provides a strong and economical roof for this well-lighted gymnasium

designed for a wide range of applications

Wider, but so light one man can handle it, Airtherm Roof Deck speeds construction time . . . cuts construction costs

Airtherm Steel Deck Sheets are furnished in 30″ widths (the widest in the industry) with five ribs spaced on 6″ centers. These ribs, 1⅝″ deep, have a bearing surface of ⅝″ and a top opening of only ¾″ wide. These wider, self-aligning sheets mean fewer longitudinal laps with resultant savings in construction time and costs.

Airtherm Decking provides a strong, safe and durable steel roof in flat, pitched or arched construction. It has been proved in installations as side walls, partitions, canopies, and as a sub-base for concrete or aggregate flooring. This versatility, plus its attractive appearance, has led to many unique applications in a wide range of structures.

18-GAUGE AIRTHERM ROOF DECK	PROPERTIES
Section Modulus (in.) 3	.220
Moment of Inertia (in.) 4	.263
Resisting Moment (in lbs.)	3960

To care for all contingencies relative to geographical areas and various purlin spacing, Airtherm Decking is also manufactured in No. 22 Gauge and No. 20 Gauge metal thicknesses.

FABRICATED PRODUCTS DIVISION
Airtherm

see our catalog in S or write for copy

For more complete information consult our catalog in Sweet's 2dAi, or write . . .

MANUFACTURING COMPANY
785 South Spring Avenue
St. Louis 10, Missouri

Member: Metal Roof Deck Technical Institute

. . . Highway dollar

Continued from preceding page

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Wovn wi fnce #7 ga galv reinf conc posts	lf	......	2.50	......
Picket fence 4′, pckts ¾″ sqx9¼″; ¾″x3′8″ both 6″ c-c; posts-bars 2″x1½″x5′, 4 rls 1¾x½″	lf	......	17.15	......
Pickt fnce 6′6″, Pckts ¾″sqx6′6″, 6″c-c, Posts 3″I's@5.7#, 9′3″, 10′ c-c; 2 rls 1L 2″x2¼″	lf	......	15.56	......
Cattle fncg Des 1047-6-9 State-furn cedar posts 10′ c-c	lf	......	0.97	......
Timber & lumber	Mfbm	389.00	237.00	118.75
Stress-grd timb & lumber	Mfbm	......	400.00	......
Creos timb & lumb.	Mfbm	512.88	493.29	427.71
Relay pipe	lf	3.01	2.57	2.10
Conc cribg-1 hdr wdth 6′ f-f of stretches face	sf	7.31	5.30	5.00
Pneum projectd conc.	sf	......	0.93	......
Emuls carb black	lb	0.150	0.134	0.128
Hwy RR barricade	lb	10.00	8.14	6.89
Barricade perm, elec ltd 4 rls 2x6″ 4x8″ base, 2x6″ posts & braces, 60w lghts 8′ c-c	lf	......	13.15	......
Top crse bit mac, opt asph cb road mix	t	5.75	5.53	5.25
asph emuls road mix	t	......	4.00	......
Bit matl A cutback	gal	0.20	0.191	0.18
emuls	gal	......	0.17	......
ROB grav fill	cy	3.47	2.58	2.37
bagged scrn	cy	......	3.09	......
Grd grav fill	cy	......	4.64	......
ROB grav, slag or ROCr sh stone fill, opt	cy	......	3.34	......
Reflector hwy-RR X signs	ea	250.00	202.50	162.50
RR warn sign reflectg.	ea	100.00	70.00	53.33

Seeding & sodding

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Topsoil pl from stockpls	cy	1.60	1.12	0.73•
Topsoil, f&p	cy	4.77	4.16	2.00
Seeding	acre	499.65	325.42	284.08
Seeding prepared areas	acre	441.03	368.52	300.00
Sodding	sy	2.15	1.45	1.30
Mulching	acre	......	200.00	......
Selective thining, prung cutg bushes & trees	acre	328.57	291.71	270.44
Conc admix-Plastiment or eq	lb	......	0.226	......
Air entrn agt-Darex or eq	gal	2.00	1.73	1.09
Paint, battleshp gray f	gal	......	2.59	......
Paint red lead f	gal	8.50	4.66	2.92
Paint alum f	gal	3.65	3.42	3.00
Paint gray-green f	gal	......	2.53	......
Bridge bearing pads-rubber impreg fabr.	sf	......	10.66	......
Lead plates	lb	......	0.41	......
Stl br grtg, main bars: 2½x5/16″ 2½c-c; crimpd bars: 1½x5/16″ galv after assembly	sf	......	4.15	......
F&I open-stl deckg eq to Reliance 10A or Irv to rec 1 coat rust inhib	sf	......	2.83	......
F&I open walkwy deckg Borden B galv or eq.	sf	......	5.00	......

Ducts & conduit

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Duct bank-Cl 3 conc, ducts 4″ID transite Korduct, No crete or equal (cmt & exc pd septly:				
2-duct, envel 10x18″	lf	......	2.19	......
3-duct 10x30	lf	......	3.02	......
4-duct 20x18	lf	......	4.06	......
5-duct 30x18	lf	......	7.50•	......
6-duct 30x18	lf	......	6.19	......
7-duct 40x18	lf	......	10.50	......
F&I asb cmt cond eq JM Transite Korduct,				
2 ″φ	lf	1.50	1.45	0.60
3 ″φ	lf	1.65	1.53	1.46
3½″φ	lf	......	0.86′	......
4 ″φ	lf	......	1.50	......
Fibre cond for duct lines 4″ID wood-pulp impreg bit ins comp Bermico Orangeburg or equal	lf	......	1.20	......
Clay ducts 3½x3½″ inside, 5x5″ outside, 18″ lg	lf	......	3.00	......

Water & gas pipe

Items: 1953 lettings	Unit	High†	Aver‡	Low†
CIP B&S, CL & fitgs				
f&i 2″φ	lf	......	2.00	......
4″	lf	7.00	6.48	3.20
6″	lf	8.35	4.60	3.00
8″	lf	12.21	6.24	5.79
10″	lf	......	6.00	......
12″	lf	14.00	11.09	8.65

•1cont 45,000 cy@$0.70/cy •′10,880 lf..........

Continued on following page

Weyerhaeuser White River Operation Uses Aeroquip

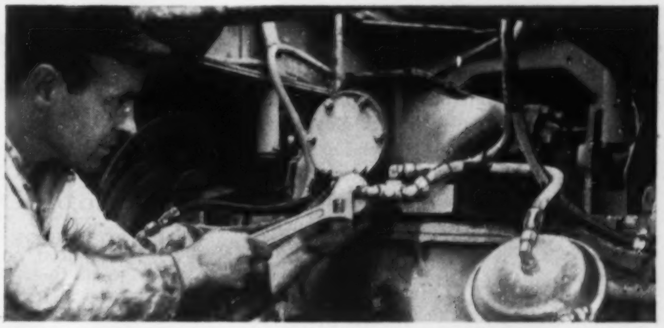
Bulk Hose and Fittings to Replace Damaged Hose Lines

in 5 to 10 Minutes!

Big, busy Weyerhaeuser Timber Company operates a fleet of trucks over their own road system at White River, Washington. Here the terrain is rough, and loads are big . . . up to 100,000 pounds per vehicle. Brake lines obviously are extremely important and Weyerhaeuser has standardized on Aeroquip replacements for two reasons: (1) Aeroquip quality is always dependable; (2) The 'Aeroquip Idea' of making hose lines from bulk stock and detachable, reusable fittings permits *quick* replacements right in the field. Get these Aeroquip advantages for your fleet. See your Aeroquip distributor or write for information.

Here a Weyerhaeuser field mechanic removes the Aeroquip fittings from a damaged hose line. Fittings are reused on replacement lines.

After assembling a fitting on one end, the Aeroquip bulk hose is measured and cut to proper length with a hacksaw.



Assembly completed, the replacement line is installed on the brake system. Weyerhaeuser mechanics make field repairs like this in 5 to 10 minutes using ordinary hand tools.

Aeroquip

REG. TRADE MARK

AEROQUIP CORPORATION, JACKSON, MICHIGAN

LOCAL REPRESENTATIVES IN PRINCIPAL CITIES IN U.S.A. AND ABROAD • AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD

JOB AFTER JOB, FRANKI FOUNDATIONS
SAVE TIME, TROUBLE and MONEY!

U.S. Air Force
saved
$40,000!

The foundations for a double-cantilever maintenance hangar for Hanscom Air Force Base at Bedford, Mass., were originally planned as spread footings by the U. S. Corps of Engineers. Using Franki Displacement Caissons as an alternate design, the contractor, F. D. Rich Co., Inc., cut installation time in half and eliminated over 400 cubic yards of heavily reinforced concrete. As a result, *F. D. Rich Co. saved the U. S. Air Force $40,000!*

With the installation of these Displacement Caisson, Franki has again graphically demonstrated the ability to save *time, trouble* and *money* for client and contractor alike. For complete information on Franki Methods, write Franki Foundation Co., 103 Park Avenue, New York 17, N. Y. for brochure and "Franki Facts" on this job.

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$7,500

PALISADES HOUSE
Bronx, N. Y.
$30,000

PITTSBURGH COKE & CHEMICAL CO.
Neville Island, Pa.
$20,000

McWILLIAMS FORGE CO.
Rockaway, N. J.
$10,000

U. S. AIR FORCE
Chicopee Falls, Mass.
$30,000

... to name a few!

See Our Catalog in SWEETS

FRANKI FOUNDATION COMPANY
NEW YORK, N. Y.
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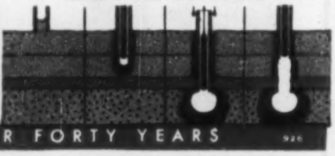
FRANKI INSTALLATION PROCEDURE



FIRM FOUNDATIONS FOR OVER FORTY YEARS

. . . Highway Dollar

Continued from preceding page

Items: 1953 lettings	Unit	High†	Aver‡	Low†
14"	lf	......	17.00	......
16"	lf	......	20.49	......
20"	lf	......	30.00	......
24"	lf	......	36.30	......
CIP CL Univ fitgs, cl 150 f&i:				
3"φ	lf	......	3.00	......
6"	lf	7.54	7.00	6.20
8"	lf	12.00	10.32	6.00
12"	lf	......	12.00	......
CIP B&S cl C or D furn	ton	......	207.90	......
Install CIP & fitgs B&S,				
2"φ	lf	......	1.25	......
4"	lf	......	3.00	......
6"	lf	......	3.97	......
8"	lf	......	4.55	......
10"	lf	......	7.14	......
12"	lf	5.00	4.95	4.95
20"	lf	......	6.60	......
Remv, clean, relay B&S CIP 6"φ	lf	3.00	2.63	2.40
8"	lf	......	3.00	......
10"	lf	......	18.71	......
CI soil pipe f&lay 8"φ	lf	......	3.20	......
Furn cl D B&S CIP specials	ton	......	399.48	......
Remv B&S CIP 12"	lf	......	3.80	......
20"	lf	......	4.13	......
Reloc valve & v boxes incl conc base 6"φ	ea	200.00	96.94	75.00
for house serv	ea	47.06	35.14	25.00
Alter elev water valve boxes, add pipe & fitg	ea	39.71	29.65	10.00
F&lay stl water P ctd & wrappd, cmt-lind				
8"φ	lf	......	23.00	......
12"	lf	......	30.68	......
16"	lf	......	43.00	......
20"	lf	......	50.00	......
48"	lf	......	60.00	......
Red brass pipe 85% coppr fed specs WWP351,				
¾"φ	lf	......	3.00	......
1"	lf	4.00	1.86	1.50
2"	lf	......	6.00	......
F&lay stl water P, fitgs, screw couplgs, ctd, cmt-lind 1¼"φ	lf	......	2.50	......
2"	lf	......	3.00	......
Gas carrier P, stdwt, seamless, black welded stl ASTM-A53 bare				
2"φ	lf	......	1.38	......
6"	lf	......	4.60	......
Tar-impreg wrappd Pipe Prot Serv Inc spec 3A, 4"φ	lf	......	4.50	......
6"	lf	......	5.16	......
8"	lf	......	8.17	......
F&i water gate vlv, fndn & boxes; AWWA iron bodies & brnz mntngs 2"φ	ea	50.00	42.85	25.00
4"	ea	......	100.00	......
6"	ea	103.33	102.90	100.00
8"	ea	125.48	122.76	115.63
10"	ea	......	200.00	......
12"	ea	404.55	322.92	190.38
16"	ea	1,200.00	900.00	600.00
20"	ea	......	1,200.00	......
Reloc hydrant assemblies incl pipe & fittgs	ea	249.07	197.76	83.00
Remov hydrant assemblies	ea	144.69	101.31	80.00
Instl hydrant assemblies	ea	183.33	122.74	115.00
F&i hydrant assemblies	ea	475.00	393.14	175.00
F&lay WIP & fittings				
1"φ	lf	......	1.00	......
2"	lf	......	2.00	......
Sheet asph pvmt, 1½" asph top, 1½" asph binder no conc or stn base	sy	......	2.01	......
Reloc street signs	ea	......	30.00	......
Project signs 8'x12'	ea	337.50	293.75	75.00
Granite block surfacg, sand-filld jnts; incl sand cushion, blks 3"-5" deep	sy	......	4.80	......
Granite block pavg incl mort cush & grtd jts, not incl conc fndn; blocks new or redressed; cmt pd separately	sy	9.00	5.86	5.81
Timb curb 2"x12", staks 2"x4" 3' lg, 4' c-c	lf	......	1.00	......
Cinders, loose measure	cy	6.08	5.95	5.27
Longt jt supports, opt.	ea	2.15	2.00	1.75
CaC12 tr grav shoulder	cy	5.00	3.05	2.50
outside	cy	3.04	2.68	2.13
inside	cy	3.13	2.73	2.04
manipulations only, wtr &CaC12 pd separately				
outside	cy	......	1.60	......
inside	cy	......	1.10	......

Electrical

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Undrgrnd cabl, wire strnd shld VC lead cabl				
4,800v 3-cond #4wire	lf	......	1.35	......
2,400v 2-cond #6wire	lf	......	1.00	......
#8wire	lf	......	1.00	......

Continued on following page

. . . Where the highway dollar goes

Continued from preceding page

Items: 1953 lettings	Unit	High†	Aver‡	Low†
Neoprene signl cable f&i 3-cond #14wire	lf	1.12	0.98	0.75
7-cond #14	lf	......	1.00	......
9-cond #14	lf	2.00	1.58	1.00
12-cond #14	lf	......	1.20	......
20-cond #14	lf	......	1.40	......
4-cond #12	lf	0.80	0.66	0.63
9-cond #12	lf	1.50	1.06	0.93
2-cond #10	lf	1.50	1.14	0.98
Power cable 2-cond #8 strnd wire, neoprene-jacketd for 600v	lf	......	1.73	......
Bick stl P cond 1¼"φ	lf	......	1.82*	......
1½"	lf	......	1.67	......
2"	lf	......	1.87	......
3"	lf	......	3.00	......
4"	lf	3.50	3.73	3.25
Rubber-ins neoprene ctd cond, #12, f&i..	lf	......	0.27	......
#6..................	lf	0.43	0.31	0.21
#4..................	lf	......	0.26	......
#2..................	lf	0.65	0.49	0.37
#1/0................	lf	......	0.70	......
#2/0................	lf	0.94	0.72	0.57
#4/0................	lf	......	1.09	......
Undergrnd power cable rubber-in neoprene jacktd, 1 cond #6wire	lf	......	0.30	......
2 cond #6	lf	......	0.99	......
2 cond #4	lf	......	1.35	......
4 cond #2/0	lf	......	4.47	......
4 cond 250MCM	lf	......	6.46	......
Fibre cond Orangebrg or eq, Harrington tapr jts or eq, 3" φ f&p	lf	......	0.80	......
4"φ	lf	0.90	0.87	0.80
Copper wire bare, hard-drwn & strnded#2/0 f&p..................	lf	......	0.60*	......
Taperd steel pole eq Monotube or; incl reinf conc footg, fittg 20'lg#11ga,butt8"φ	ea	......	350.00	......
28' #3 9"	ea	......	450.00	......
36' #3 13"top 7½"φ.	ea	......	475.00	......
Monotube or sectionl stl pole; butt 9⅝"OD, 0.5" metal; incl reinf conc ftg, fitgs:				
32'lg, app wt 1458#	ea	500.00	447.33	428.18
34'lg 1535#	ea	510.00	486.00	478.00
Galv steel cond HD f&i ¾"φ	lf	......	1.40	......
1"	lf	......	1.56	......
1¼"	lf	......	1.98	......
1½"	lf	......	2.08	......
2"	lf	2.67	2.19	1.50
2½"	lf	......	2.50	......
3"	lf	3.40	3.35	3.19
3½"	lf	......	3.00•	......
4"	lf	5.26	5.10	4.35
Galv WI cond, HD f&i				
1½"φ	lf	2.04	1.64	1.50
2"	lf	2.11	1.70	1.52
3"	lf	......	3.50	......
Tr wood cond 4½"x4½", bore 3"φ, Soyel pn f&p	lf	......	2.00	......
Precast conc duct, 1 pt cmt: 2 washd sand taperd jt 1½" lg, 6"x6"OD; 4"ID f&p..	lf	......	1.11	......
4⅞"x4⅞"OD;3"bore	lf	......	1.03	......
Creos Sopn line poles, 30' long	ea	109.00	102.57	100.00
35'	ea	109.00	104.24	103.95
40'	ea	......	124.81	......
45'	ea	......	228.00	......
50'	ea	......	277.14	......
55'	ea	......	325.00	......
Galv met bin-type retaing wall 7'8⅝" face	/sf	......	3.25	......
Std elec MH 4'x6'x7' inside, walls & flr 8" conc, top slb 8"RC, incl CI frame & cover	ea	......	483.33	......
Precast conc pull boxes 4'x4'x4' inside; walls, flr, top 4" reinf 4"x4" mesh; removable-conc-slb top; incl drain & grav soak-away.....	ea	......	200.00	......
Subseal conc pvmt liq asph..............	gal	0.40	0.29	0.25
Drill subsealg holes..	ea	1.50	0.93	0.50
Expans dowels, incl ⅝" φ bolt, ⅝"φ expansn slv & drillg 4" holes	ea	......	2.41	......
Remov conc in structs	cy	64.10*	37.37	20.00
Vert sand drains 18"φ	lf	1.60	1.55	1.10
Sand drain blanket, meas in place......	cy	......	3.50	......
Settlemt pltfrm 3x3' wd frame or steel bars window-screen-coverd, attachd to 2½"φ30' stl P..............	ea	......	500.00	......
Furn & mntn piezometrs incl saran tubing, clay Slurry, & Bourden ga vacuum pres type...	ea	......	750.00	......

* 158,500 ft in cont   *• 3,300 lf in cont

In the preceding pages are the unit prices that landed New York state highway and Thruway contracts in 1953. This is the most concentrated and detailed summary of bid prices that has been published in ENR. They were developed under the direction of E. T. Gawkins, deputy chief engineer, New York Department of Public Works.

The preceding prices are average low bids. But every individual project produces its own unit prices and these differ, even on jobs next door to each other.

Two 1954 projects illustrate these basic principles and in addition they show the complex pricing and construction problems involved in putting express highways through solidly built-up suburban and big-city areas.

The Yonkers section, New York Thruway, for example, will cost $15.4 millions. This is 14% under the engineer's estimate and an example of the highly competitive bidding in 1954. This section of the Thruway, only 2.94 miles long, requires eight grade separation structures, a traffic interchange with another major parkway and a main city avenue, several exit and entrance ramps at other points, extensive relocation of gas and electric utility lines, and removal of existing structures.

James S. Bixby, district engineer, Poughkeepsie will direct the construction.

The combination of Yonkers Contracting Co., Inc. and Corbetta Contracting Company, New York, was the successful joint venture out of a field of seven bidders in May 1954. They must complete the work by December 1, 1955.

Inspection of the unit prices will show that the contractor has averaged his prices for each class of work and standardized them for the various subdivisions of the job.

The Yonkers Thruway connects at the New York City line with the Major Deegan Expressway through the Bronx.

The successful bid for a $2.86 million section of the Major Deegan Expressway follows the Thruway bids.

Milton E. Goul, district engineer, Babylon, New York will direct this work.

Slattery Rock Corporation, Maspeth, New York, in May, 1954 placed the successful bid out of six. Work on this section must be completed by August 1, 1955.

B. D. Tallamy is both Chairman of the State Thruway Authority and State Superintendent of Public Works.

Continued on following page

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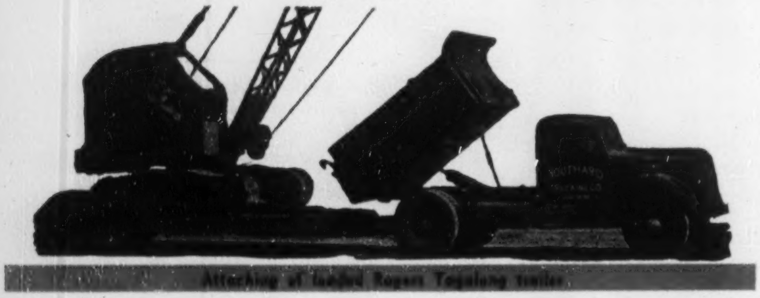
Attaching of loaded Rogers Togalong trailer

. . . Highway dollar

Continued from preceding page

• **New York Thruway—Yonkers Section** connects with Major Deegan Expressway.

Besides the grading and paving of two 37-ft. concrete traffic arteries (six lanes separated by a 12-ft. central mall) on nearly 3 miles of main route, this contract includes 9.54 miles of access and marginal roads including 32-ft. concrete arteries on each side of the Thruway for local traffic.

1C	Yonkers Contg. Co., Inc., and Corbetta Constr Co., Inc., New York, N. Y.	$15,416,893
2	Poirier & McLane Corp. and Johnson, Drake & Piper, Inc., New York, N. Y.	15,492,466
7	S. J. Groves & Sons Co. and Kenny Constr. Co., New York, N. Y	17,466,482
EE	N.Y. Dept. Public Works, Albany	17,921,000

Pavement: 2.94 mi thruway, 0.70 ramps $7,519,382
(9" CC pavement 2.94 mi, 9" unreinf CC pavement 0.70 mi)

Bids: 5-20-54 1 C Item	Unit	Quantity	Unit Price
Clear & grub	ls	40%	$12,500
Compact control bldg	ea	1	800.00
Water equip, furnish	ls	40%	3,125
apply	Mgal	100	5.00
Exc, uncl	cy	714,000	2.40
trench, culv & bri	cy	160,000	5.50
Trim road section	lfrd	16,300	0.75
Prepare fine grade	sy	144,600	0.35
Pipe underdr opt 6"	lf	22,900	1.00
CMP 12"	lf	650	3.20
RCCP 18"	lf	4,740	5.00
24"	lf	640	7.60
30"	lf	370	11.75
36"	lf	900	15.00
42"	lf	1,050	19.50
48"	lf	1,260	23.50
72"	lf	350	44.00
RCP sew 18"	lf	6,800	4.60
24"	lf	870	7.00
36"	lf	2,100	13.75
42"	lf	1,120	18.00
48"	lf	1,130	21.75
54"	lf	170	26.00
60"	lf	380	30.50
72"	lf	650	42.00
Cement, portland 2	bbl	52,000	5.00
6A	bbl	30	10.00
1A	bbl	59,800	5.00
natural N	bbl	15,960	5.00
CaCl, furn & apply	ton	19	70.00
Conc 1A for structs	cy	37,890	48.50
1	cy	65	48.50
2	cy	370	30.00
Reinf mat for conc pvmt	syp	126,150	0.80
stl fabric	sy	50	0.75
Jt suppt opt long	ea	47,275	0.90
transv	lfjt	11,360	1.80
Transload cont & constr jt suppt.	lfjt	100	1.55
Reinf bar for struct	lb	865,000	0.15
Misc metal	lb	86,500	0.20
Rail, guide beam type, opt	lf	575	3.00
metal	lf	13,300	6.00
Fndn crse gran matl	cy	43,500	3.00
Bot crse bit mac pen asph	cy	1,700	17.00
CC pvmt	cy	31,530	12.00
unreinf	cy	4,670	12.00
Asph conc opt	ton	1,700	12.00
Bit matl A, pave	gal	30,000	0.17
T, rd tar	gal	10,000	0.24
Maintain & prot traffic	ls	40%	125,000
Dry stone pave	sy	5,300	1.00
Pile, temp sheet, stl	sf	85,400	2.25
timber	sf	41,000	1.25
conc, cip	lf	4,100	5.00
drive equip, furn	ls	20%	3,750
Conc curb A	lf	25,100	1.35
B	lf	30,700	1.35
D	lf	9,300	1.35
F	lf	400	3.75
H	lf	2,550	3.85
gutters B	sy	3,300	11.00
Catch basin C-4	ea	160	150.00
C-5	ea	5	250.00
Drop inlet D-1	ea	22	98.00
MH, storm dr M-1	ea	38	198.00
M-6	ea	18	242.00
M-7	ea	8	294.00
M-8	ea	4	338.00
M-11	ea	2	1,000
M-12	ea	3	770.00
specl	ea	1	830.00
CB, MH & drop inlt-extra dpth	lf	380	15.00
ROW marker, opt	ea	220	12.00
Timber & lumber	Mfbm	4	400.00
ROB gravel fill	cy	59,700	3.00
Sand backfill	cy	15	4.00

Continued on following page

. . . . Highway dollars

New York Thruway—continued

Bids: 5-20-54 1 C Item	Unit	Quantity	Unit Price
Topsoil from S-pile	cy	4,650	1.50
Seeding	ac	13.8	425.00
Fndn crse ROB grav LM	cy	4,300	3.00
CaCl treat grav out shldr	cy	6,100	3.75
Inspect by Dept Watr Supply, Gas & Elec, NYC	day	200	10.00
Settlement platforms	ea	10	50.00
Piezometers	ea	4	750.00
Control stakes	ea	30	40.00

Parkway interchange 2.17 mi. . . . $4,014,437
(9″ unreinforced CC pavement)

Clear & grub	ls	40%	$12,500
Water equip, furn	ls	40%	3,125
apply	Mgal	100	5.00
Exc, uncl	cy	379,000	2.40
trench, culv & bri	cy	116,400	5.50
Trim rd section	lfrd	37,100	0.75
Prepare fine grade	sy	146,500	0.35
VCP sew 8″	lf	320	1.25
12″	lf	7,235	2.30
15″	lf	90	3.75
21″	lf	750	6.00
wyes 12″	ea	90	10.40
Pipe underdr opt 6″	lf	900	1.00
RCCP 18″	lf	10,610	5.00
24″	lf	2,240	7.60
27″	lf	90	8.75
30″	lf	650	11.75
36″	lf	500	15.00
42″	lf	110	19.50
54″	lf	730	26.50
66″	lf	120	38.00
RCP sew 18″	lf	2,500	4.60
24″	lf	570	7.00
30″	lf	130	10.75
Cement, portland 2	bbl	1,400	5.00
1A	bbl	62,410	5.00
natural N	bbl	9,050	5.00
CaCl, furn & apply	ton	1	70.00
Conc 1A for struct	cy	1,466	48.50
1	cy	577	48.50
2	cy	1,685	30.00
Stl fabric reinf	sy	20,800	0.75
Long jt suppt, opt	ea	33,250	0.90
Transload contract & constr jt suppt	lfjt	660	1.55
Bar reinf for struct	lb	118,000	0.15
Misc metals	lb	254,000	0.20
Rail, beam gd, opt	lf	525	3.00
metal	lf	730	6.00
Fndn crse gran matl	cy	35,450	3.00
Bot crse bit mac pen asph	cy	1,800	7.00
Unreinf CC pvmt	cy	32,650	12.00
Asph conc opt	ton	1,800	12.00
Bit matl A pave	gal	32,000	0.17
Maintain & prot traffic	ls	40%	125,000
Temp timber sheet pile	sf	500	1.25
Reset old curb	lf	6,700	3.25
stone header	lf	200	3.00
Conc curb C	lf	32,200	1.35
D	lf	12,100	1.35
E	lf	1,300	6.20
F	lf	3,100	3.75
G	lf	200	1.35
H	lf	3,700	3.85
Spec bit gutters	lf	250	2.00
CB 6	ea	21	300.00
7	ea	8	250.00
8	ea	183	160.00
9	ea	9	180.00
Drop inlet 3	ea	12	145.00
MH, storm dr M2	ea	5	145.00
M3	ea	33	230.00
san sew M4	ea	54	320.00
M5	ea	7	320.00
storm dr M8	ea	4	338.00
M9	ea	2	700.00
water vlv 10	ea	61	158.00
specl 13	ea	1	1,230
15	ea	1	850.00
16	ea	1	370.00
MH, CB & DI extra depth	lf	920	15.00
alter	ea	57	75.00
ROW marker, opt	ea	50	12.00
Conc sidewalk	sy	20,800	4.00
Timber & lumber	Mfbm	4	400.00
creosoted	Mfbm	7.5	500.00
ROB gravel fill	cy	1,800	3.00
Sand backfill	cy	2,985	4.00
Topsoil from stk-piles	cy	5,200	1.50
Seeding	ac	15.7	425.00
Gate vlv, f&p, 6″	ea	4	95.00
8″	ea	28	130.00
12″	ea	17	2[illegible]8.00
16″	ea	1	457.00
18″	ea	5	930.00
24″	ea	5	1,441
30″	ea	2	2,350
48″	ea	1	6,650
Hydrant assemb, relocate	ea	6	125.00
rem	ea	27	65.00
f&p new	ea	10	325.00
Buffalo box	ea	6	50.00
Fndn crse ROB grav LM	cy	3,100	3.00
CaCl treat grav out shldr	cy	370	3.75

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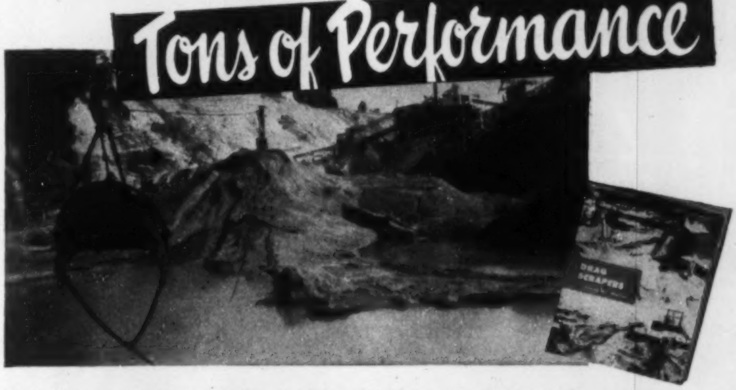
Moderate cost . . . light on labor
little maintenance . . . BUT



Crescent Scraper of 5-cu. yd. capacity—rigged for gravity return—shown returning to excavation point in the pit. Ask for Catalog A and Field Report 214.

SAUERMAN EQUIPMENT

Check digging power . . . rate of haul . . . clean dumping. Add labor economy . . . low upkeep . . . personnel safety . . . moderate power consumption. Total up the score . . . you'll choose one of these Sauerman Machines for your operation.

DRAG SCRAPER: *best* for pit or hill excavation, reclamation or general handling of materials, wet or dry. Serves as rapid, long range conveyor. Sizes 1/3 to 15 cu. yds.

SLACKLINE CABLEWAY: *best* for deep digging — especially underwater — and conveying to a high delivery point. Reaches down a hundred feet or more . . . spans up to 1000 ft. . . . sizes 1/3 to 3½ cu. yds.

TAUTLINE CABLEWAY: *best* for long range aerial work. Lifts, conveys, places loads of unwieldly material. Ideal for dam construction or for conveying loads over streams and canyons.

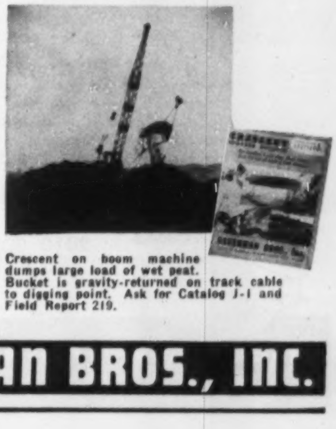
CRESCENT SCRAPER ON BOOM MACHINE: *best* for increasing the work capacity of any boom machine on backfilling and grading jobs. When scraper is used with track cable and trolley, machine range is greatly extended.

Call on Sauerman's *experienced* engineers for the size and type system *best* suited to your digging, hauling or materials handling requirements. Write for catalog . . . ask for idea-packed Sauerman News.

Slackline cableway performs difficult excavation of non-caving material from deep pit. 70% rock and 30% colloidal sand posed tough digging job. Ask for Catalog C and Field Report 216.

TAUTLINE CABLEWAYS

Tautline Cableway spans 920 ft. to carry 4-cu. yd. bucket of concrete from mixing point to dam site.



Crescent on boom machine dumps large load of wet peat. Bucket is gravity-returned on track cable to digging point. Ask for Catalog J-1 and Field Report 219.

ONE MAN MATERIALS HANDLING

SAUERMAN BROS., INC.

INTERNATIONAL STEEL COMPANY
2010 EDGAR STREET, EVANSVILLE 7, INDIANA
Send me without obligation my personal copy of
☐ Steel Fabrication Services Guide
☐ Doors for Industry and Aviation
NAME AND POSITION
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MAIL THIS COUPON FOR NEW GUIDES TO PROVED CONSTRUCTION ECONOMIES

Steel framework for new railroad loading dock built for
BALL BROTHERS COMPANY, Muncie, Indiana
CARL VESTAL COMPANY, Indianapolis, Indiana: Erectors
LAWRENCE J. SNYDER COMPANY, Muncie, Indiana: Contractors
INTERNATIONAL STEEL COMPANY: All structural steel, galvanized beaded sheets on roof and sides.

INTERNATIONAL SERVICE IS

"Integrated Service"

COMPLETELY INTEGRATED SERVICE — from preliminary planning to final delivery on the job — is the kind of "profits insurance" you *can* bank on from International. It's the *proved* structural steel service which won the contract for the big Ball Brothers Company rail freight project shown above. And further proof of its soundness is the similar dock just completed — built for handling truck freight — with all steel for construction again supplied by International.

The continued success of this INTERNATIONAL SERVICE has been built entirely on teamwork. Starting from scratch, or at any stage of construction, International's engineers stand ready to assist you as needed. Standard warehouse steel stocks cover every requirement, and every requirement is treated as a "rush order." Special fabrications are an International specialty, with toughest problems taken right in stride.

The same International teamwork is ready to go to work for you, any time you say the word — on any type or size of project. Meanwhile, you'll find it worth while to use the above coupon!

17½-ton crane door for steel warehouse service—completely engineered and fabricated by International. Industrial doors and aviation doors, from the smallest to the world's largest, are built by International.

INTERNATIONAL SERVICE

2010 EDGAR STREET
EVANSVILLE 7, INDIANA

AISC

INTERNATIONAL STEEL COMPANY

. . . Highway dollar

New York Thruway—continued

Bids: 5-20-54 1 C Item	Unit	Quantity	Unit Price
Chain link dble gate f&p	ea	2	$280.00
fence 8′ f&p	lf	3,500	5.60
rem	lf	3,200	0.90
reset	lf	2,500	3.30
Iron picket fence rem	lf	270	1.75
reset	lf	110	4.00
Air release valves	ea	3	50.00
CIP "C" mech jt, watr, f&p 8″	lf	100	5.21
12″	lf	100	8.71
16″	lf	100	12.89
24″	lf	140	23.54
Couplings, f&p 12″	ea	4	38.23
30″	ea	50	81.94
48″	ea	10	131.50
Fiber cond f&p 3″	lf	2,000	1.20
Rem stone curb	lf	43,000	0.75
flagstone walks	sy	9,500	1.00
Reset flagstone walks	sy	250	5.40
House watr serv conn f&p	ea	1	100.00
Corp cock 2″ f&p	ea	9	33.72
Lighted barricade	ea	6	1,000
CIP, water:			
cl C bell & sp furn 6″	ton	4	141.10
8″	ton	260	141.10
12″	ton	305.1	141.10
16″	ton	21	141.10
18″	ton	325	141.10
24″	ton	42	141.10
30″	ton	270	131.10
48″	ton	570	131.10
cmt lind, B&S, furn 24″	ton	11	146.10
30″	ton	8.6	136.10
cmt lind plain end furn 30″	ton	25	141.10
cl C pl end furn 48″	ton	20	141.10
cl C specl, furn	ton	115	300.00
& specl, lay, 6″	lf	220	1.65
8″	lf	9,900	2.25
12″	lf	6,575	3.25
16″	lf	210	3.25
18″	lf	3,750	4.75
24″	lf	170	4.25
cmt lind lay 24″	lf	74	4.75
B&S, PE 30″	lf	170	6.25
& specl lay 30″	lf	1,400	16.75
B&S, PE, lay 48″	lf	1,520	15.25
Rem frame, grate, cov exist MH, CB, DI	ea	270	50.00
Rem exist city own facil	ls	1	14,900
F&p new stanchions & attach park meter	ea	60	25.00
Disinfect water main	ls	1	1,250
Traf contrl light f&p	ls	1	3,750
Wood poles, f&p	ea	32	90.00
Twin conduct cble #0, f&p	lf	8,500	1.40
Galv stl P cond f&p 3″	lf	450	4.50
Precast serv box	ea	7	90.00
Prestress conc Pf&p 30″	lf	2,860	23.10
Sump pump & connect f&p	ea	1	600.00

10 misc secondary roads........$1,537,845

(9″ unreinf cc pave 6.01 mi; 2½″ asph conc opt 0.60 mi; misc 0.06 mi)

Item	Unit	Quantity	Unit Price
Clear & grub	ls	20%	12,500
Water equip, furn	ls	20%	3,125
apply	Mgal	55	5.00
Selected borrow	cy	45,000	1.50
Exc, uncl	cy	381,000	2.40
trench, culv & brl	cy	12,150	5.50
Trim road section	lfrd	10,400	0.75
Prepare fine grade	sy	32,400	0.35
VCP 12″	lf	215	2.30
RCCP 18″	lf	2,865	5.00
24″	lf	155	7.60
30″	lf	30	11.75
36″	lf	225	15.00
42″	lf	120	19.50
48″	lf	200	23.50
RC sew 18″	lf	1,865	4.60
36″	lf	165	13.75
Cement, natural N	bbl	1,820	5.00
portland 1A	bbl	12,630	5.00
Concrete 1	cy	85	48.50
2	cy	35	30.00
Long jt suppts opt	ea	10,025	0.90
Transload contr & constr jt suppt	lfjt	160	1.55
Reinf bar for struct	lb	3,550	0.15
Misc metals	lb	58,000	0.20
Beam guide rail, opt	lf	525	3.00
Fndn crse gran matl	cy	9,250	3.00
Bot crse bit mac pen asph	cy	210	7.00
Unreinf CC pvmt	cy	7,650	12.00
Asph conc opt	ton	200	12.00
Bit matl "A" paving	gal	3,550	0.17
Maint & prot traffic	ls	20%	125,000
Dry stone pave	sy	80	6.00
Rem exist pkway brl	ls	1	$31,250
Temp stl sheet piling	sf	16,700	2.25
Conc curb "G"	lf	21,100	1.35
Catch basin 8	ea	72	160.00
9	ea	1	180.00
MH, storm dr 3	ea	5	2.30
san sew, 4	ea	2	320.00
specl	ea	1	1,400
CB, DI, extra depth	lf	130	15.00
ROW markers opt	ea	80	12.00
Timber & lumber	Mfbm	2	400.00
Hway-railroad barricade	lf	600	8.00

Continued on following page

2 Big Reasons Why
PITTSBURGH'S NEW

X-L-O

IS THE BEST
STRUCTURAL-STEEL
PRIMER YOU CAN BUY!

1 Protects against corrosion during shipment and erection

2 Provides an excellent foundation coat for field painting

AFTER years of painstaking research, Pittsburgh Paint technicians have developed X-L-O Structural-Steel Primer to provide unusual protection for all kinds of fabricated structural shapes.

This remarkable product makes use of an *extracted* linseed oil that has met and surpassed Federal Specifications TT-O-369 and A.S.T.M. D-234 covering raw linseed oil. This *extracted* linseed oil possesses unusual surface wetting characteristics. When used as a liquid vehicle of structural-steel primers it assures a thorough drying of the paint film within 24 hours during all seasons of the year.

New X-L-O Primer protects against corrosion during transit and erection. It is also an excellent foundation for final coats. It is available in combination of red lead and iron oxide pigmentations. Or it can be furnished with 100% red lead, if desired. Pittsburgh METALHIDE or IRONHIDE can be used as finishing coats.

For additional information, get in touch with the Industrial Sales Division, Pittsburgh Plate Glass Company, Gateway Center, Pittsburgh, Pa. Or call the nearest factory listed below.

PITTSBURGH PLATE GLASS CO., Industrial Paint Div., Pittsburgh, Pa. Factories: Milwaukee, Wis.; Newark, N.J.; Springdale, Pa.; Atlanta, Ga.; Houston, Texas; Torrance, Calif.; Portland, Ore. Ditzler Color Div., Detroit, Michigan. Thresher Paint & Varnish Division, Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Div., Pittsburgh, Pa.

PITTSBURGH PAINTS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS • FIBER GLASS

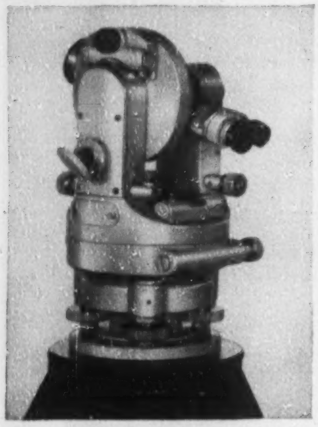
PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

SURVEYING NEWS

NEW THEODOLITE SETS UP QUICKLY, EVEN IN THE WIND

Has this been your problem? Now—old-type mechanical plumb-bob replaced by can't-miss optical principle



- Improved Theodolite reads horizontal and vertical circles simultaneously, through same eyepiece
- Reads direct to 1 min. with no matching of lines—no parallax
- Amazingly blur-free—small, compact, moisture-proof, dust-proof.

Mail this coupon for details

FENNEL

INSTRUMENT CORP. OF AMERICA
11-27 44th Rd., LONG ISLAND CITY, N. Y.

Please send me Booklet A with information on Fennel . . .

☐ Double bubble
☐ Other levels
☐ Transits
☐ Combinations
☐ Theodolites
☐ Alidades
☐ Collimeters
☐ Stands
☐ Tripods
☐ Repair of present instruments, (any make)

NAME..

ADDRESS..

....

. . . Where the highway dollar goes

New York Thrway — continued

Bids: 5-20-54 1 C Item	Unit	Quantity	Unit Price
Topsoil from S-pile	cy	5,350	1.50
Seeding	ac	16.5	425.00
Sodding	sy	1,350	1.50
Fndn crse ROB grav LM	cy	930	3.00
Lighted barricade	ea	2	1,000
Alum light stand assemb f&p cl 1	ea	47	520.00
Pkway cable #8 AWG	lf	18,000	0.40
Grounding system	ls	1	1,250
Galv stl P cond, f&p, 2"	lf	380	2.20
3"	lf	350	4.50
Control stakes	ea	30	40.00

Disposal of existing items..........$37,204

Item	Unit	Quantity	Unit Price
bldgs	ea	255	1.00
pump house	ls	1	27,800
undergrnd tank, gal 250	ea	1	75.00
275	ea	1	75.00
550	ea	80	75.00
2,000	ea	15	150.00
3,000	ea	5	150.00

Relocation of gas mains..........$211,739

Item	Unit	Quantity	Unit Price
Exc: trench, culv & brl	cy	15,000	5.50
F&I:			
Steel gas main 12"	lf	20	8.00
CIP gas, mech jt, 8"	lf	6,500	5.40
6"	lf	2,100	4.90
Stl P mill coated 1"	lf	1,300	1.95
1½"	lf	150	2.75
2"	lf	260	3.70
4"	lf	4,000	4.00
6"	lf	500	5.00
8"	lf	1,120	6.00
12"	lf	1,900	8.00
Dresser end gate vlv 1½"	ea	9	35.00
4"	ea	2	50.00
6"	ea	2	65.00
lubr plug vlv 1"	ea	90	40.00
2"	ea	5	50.00
4"	ea	11	70.00
6"	ea	6	85.00
8"	ea	8	150.00
Flange end plug vlv 12"	ea	4	300.00
Screw end plug vlv 1"	ea	20	25.00
Roadway box	ea	165	10.00
Drip pots	ea	32	100.00
10" stl slv undergrnd for 8" gas mains	lf	105	15.00
4" stl slv undergr-2" gas	lf	170	11.00
Governor pit for gov	ea	2	1,000
Dresser cpling cl 90, φ 1"	ea	115	7.50
1½"	ea	10	10.00
2"	ea	8	13.50
slv cl 40, φ 4"	ea	36	15.25
6"	ea	15	19.60
8"	ea	58	25.00
12"	ea	23	50.00

Bids: 5-20-54 1 C Item	Unit	Quantity	Unit Price
Dresser cpling cl 38, φ 4"	ea	170	16.00
6"	ea	20	21.80
8"	ea	30	27.20
12"	ea	91	35.00
38A, φ 4"	ea	4	17.50
6"	ea	7	20.00
8"	ea	6	28.00
12"	ea	1	35.00
Dresser cpl-reduc slv-φ 4"	ea	1	28.00
6"	ea	10	37.00
8"	ea	21	45.00
20"	ea	2	200.00
Precst conc reg MH	ea	3	250.00
CI frame & cov-MH, dist. box, precst sumps, i	ton	1	100.00
CI tee 8x8x6"	ea	6	205.00
bends, mech jt 11¼°	ea	3	125.00
22½°	ea	14	125.00
45°	ea	8	125.00
90°	ea	3	125.00
Serv tee incl cap-CIP 1"	ea	55	7.50
1½"	ea	10	12.00
2"	ea	2	15.00
1¼" skin tube w safety check & drill guide	ea	52	10.00

Relocated elec underground work..$199,640

Item	Unit	Quantity	Unit Price
Exc: trench, culv, brl	cy	20,650	5.50
Pipe underdr opt 6"	lf	300	1.00
Portland cement 1A	bbl	50	5.00
Alter MH & CB	ea	13	75.00
Black stl cond f&p 3"	lf	280	2.50
2000 lb conc, f&p	cy	35	100.00
CI frame & cov-MH, dist box, precst sump, i	ton	33	100.00
Precst conc sump pits, i	ea	33	75.00
PCC duct, lay, 4"	lf	94,500	0.43
3"	lf	11,700	0.40
Instl prcst conc:			
cble MH 11½x4½x6'	ea	21	150.00
M-7	ea	19	140.00
distrib box S	ea	28	80.00
BM	ea	24	60.00
TS	ea	4	90.00
Somastic coat P, i 8"	lf	820	10.00
Plaster ct waterprf, f&p	sf	1,200	1.00
Const specl MH 11-6	ea	3	2,500
M-7	ea	1	2,500

City of Yonkers share..........$20,353

Item	Unit	Quantity	Unit Price
Exc: trench, culv & brl	cy	2,400	5.50
VCP sew 8"	lf	650	1.25
Cement, natural N	bbl	20	5.00
portland 1A	bbl	130	5.00
Conc cl 2	cy	70	30.00
Misc metals	lb	2,600	0.20
MH san sew M-4	ea	6	320.00
CB, DI-extra depth	lf	70	15.0

Grade separation structures $1,876,295

			Quantities							
Bids 5-20-54 Items	Low Bid	Unit	I-B 2 sp 54'-6"	I-B 1 @ 54'-3" 2 @ 54'-6" 1 @ 30'	I-B 2 sp 55'-⅞"	I-B 1 sp 80'-7"	I-B 6 sp See a	I-B 6 sp See b	Girder 1-93'-7⅜"	I-B 2 sp 55'-3½"
Total cost without engrg			$174,442	$144,979	$157,396	$296,418	$288,255	$366,190	$287,315	$163,300
Excav, trench, culv, brig	$5.50	cy	2,600	600	1,400	2,200	1,400	700	2,400	1,900
Pipe, under dr, opt 6"	1.00	lf	200	70	160	600	....	....	540	170
Cement, portland Type 2	5.00	bbl	1,820	1,290	1,340	3,570	2,500	3,220	3,340	1,610
Natural Type N	5.00	bbl	280	210	210	150	315	430	170	105
portland Type 1A	5.00	bbl	140	170	120	530	400	530	500	245
Conc for structs, cl A	48.50	cy	1,300	900	960	2,320	1,750	2,100	2,385	1,150
railings	150.00	cy	....	2	....	3	3	3	3	....
Reinf, steel fabric	0.75	sy	1,050	1,330	1,020	1,130	2,880	3,300	1,360	1,000
bar, for struct	0.15	lb	176,000	153,000	139,000	313,000	288,000	366,000	243,000	158,000
spiral bar shr connctrs	0.70	lb	2,700	3,700	2,600	2,500	7,200	10,200	6,300	3,100
Structural steel	0.14	lb	210,000	280,000	211,800	298,000	674,000	788,000	513,000	214,400
Railing metal	12.00	lf	240	420	230	180	740	680	200	230
Pavement, cem conc, 9"	22.00	cy	90	110	80	100	210	290	110	70
Paving, dry stone	6.00	sy	....	210	....	....	750	860	....	....
Piling, stl sht, temp	2.25	sf	5,200	900	10,200	....	....	....	....	4,400
timber sht, temp	1.25	sf	....	....	400	....	....	....	....	....
cip conc	5.00	lf	....	700	....	9,000	1,100	8,000	....	....
furn equip for driv'g	....	ls	....	750[c]	....	750[c]	750[c]	750[c]	....	....
Gravel fill, ROB	3.00	cy	1,700	200	800	1,900	....	....	5,500	1,300
Top soil, pl fm s-pile	1.50	cy	....	100	....	135	200	170	85	....
Seeding on prep areas	500.00	ac	....	0.5	....	0.5	0.5	0.5	0.5	....
Sodding	1.50	sy	....	200	....	300	400	400	300	....
F&p fiber conduit 3"	1.20	lf	240	....	1,080	....	760	....	....	1,430
F&p black steel conduit 2"	2.00	lf	120	....	120	290	....	....	340	120
3"	2.50	lf	....	....	....	....	380	....	....	120
4"	3.30	lf	470	1,220	960	....	760	....	....	960
F&p steel gas main 4"	5.00	lf	120	....	....	....	....	....	....	120
6"	6.00	lf	....	....	....	....	....	....	....	120
8"	7.00	lf	....	....	120	....	....	....	....	....
F&I overhead lightg	....	ls	875	....	3,750	....	....	2,125	....	3,750
F&I under brdg lightg	....	ls	....	....	....	938	....	625	875	....
F&I under & over lightg	....	ls	....	2,000	....	....	2,625	....	....	....
F&I traf contr lightg	....	ls	2,000	1,250	1,875	....	....	....	....	1,875

[a] 1 @ 51' 3", 2 @ 75', 2 @ 54' 6", 1 @ 31' 6"

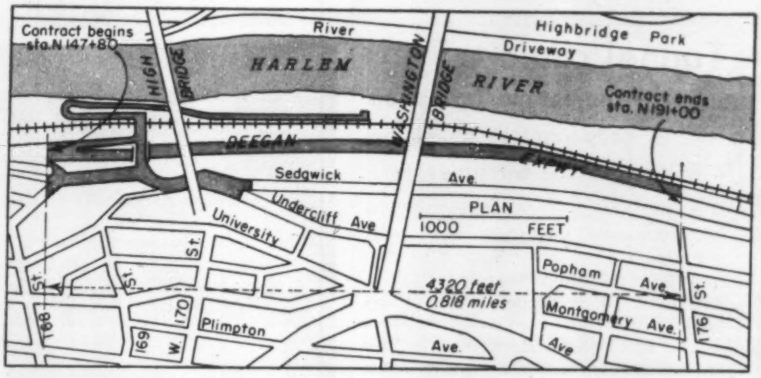
[b] 1 @ 49'-1⅞", 2 @ 58' 7½", 2 @ 55' 6⅛", 1 @ 28' 3¼"

[c] $3,750 divided between 5 operations

Continued on following page

. . . Where the highway dollar goes

Continued from preceding page



MAJOR DEEGAN EXPRESSWAY, Bronx, N. Y. connects with Yonkers section, New York Thruway

- Major Deegan Expressway

It includes a complete highway grade separation structure: 3 continuous I-beam spans of 56′-10″, 51′-5″ and 37′-0″, also complete superstructure for a railroad grade separation consisting of 4 simple I-beam spans of 39.67′, 36.04′, 39.89′ and 29.78′ and 0.82 miles of 9-inch cement concrete pavement plus 0.76 miles of sheet asphalt pavement in two 36-ft. roadways with a dividing strip of varying width.

Besides the usual earthmoving drainage, structures and pavement, the contractor must provide landscaping and extensive electrical work.

1C	Slattery Rock Corp., Maspeth, N. Y.	$2,363,943
2	Chas. F. Vachrio, Inc., Bklyn, N. Y.	2,569,208
5	Porier & McLane Corp., New York, N. Y.	2,769,876
EE	N. Y. State Dept. of Public Works, Albany, N. Y.	2,863,000

Bids: 6-10-54 1 C Item	Unit	Quantity	Unit Price
Clear & grub	ls	1	$4,500
Compact cont bldg	ea	1	1,000
Water equip, furn	ls	1	1,200
apply	Mgal	1,450	6.00
Exc, uncl	cy	213,000	1.00
trench, culv & br	cy	30,000	5.00
Trim road section	ls	1	1,400
Prepare fine grade	sy	52,600	0.25
VCP sew 6″	lf	220	2.00
8″	lf	450	3.00
12″	lf	750	5.00
underdrain 8″	lf	5,500	2.00
perf 6″	lf	1,400	2.00
CIP 6″	lf	25	15.00
30″	lf	70	30.00
RCCP 12″	lf	500	5.00
15″	lf	2,200	6.00
18″	lf	210	6.50
24″	lf	90	8.00
30″	lf	450	15.00
60″	lf	300	45.00
RCP sew 15″	lf	2,100	6.00
18″	lf	600	6.50
24″	lf	900	8.00
42″	lf	20	19.00
Cement, portland, 1	bbl	1,450	4.00
1A	bbl	18,250	4.00
2	bbl	7,500	4.00
natural, N	bbl	4,800	5.00
Conc 1A, structs	cy	2,525	44.00
railings	cy	5	150.00
1	cy	1,800	30.00
3	cy	350	35.00
Masonry, stone	sf	17,300	4.00
dimension	sf	3,900	6.00
rubble	sf	1,050	5.00
Reinf stl fabric	sy	850	0.60
conc pvmt, metal	syp	37,000	0.80
bar	lb	9,300	0.20
Jt supports, opt, long	ea	12,800	1.00
transv	lfjt	3,300	2.00
Bar reinf, structs	lb	497,000	0.14
spiral shear conn	lb	5,600	1.00
Str stl	lb	590,000	0.24
Misc metals	lb	110,000	0.20
Fndn crse gran matl	cy	18,500	4.50
Bottom crse-broken stone	cy	165	10.00
Pvmt fndn conc	cy	2,700	11.00
CC	cy	480	14.00
w carbon black	cy	8,700	14.00
Asph conc, opt	ton	170	16.00
Bit matl	gal	1,300	1.00
Prot crse, membr waterprf	sy	40	9.99
Prot & maintain traffic	ls	1	8,200
Temp footbr-Highbr Sta	ls	1	2,500
Stone fill	cy	300	5.00
Dry riprap	cy	100	15.00
Rock filled slope	cy	150	15.00
Rem bri superstruct "DP"	ls	1	30,000
"W 171"	ls	1	28,500
Pile stl sheet	sf	8,200	3.85
temp	sf	4,000	3.10
timber sheet	sf	8,400	1.25
temp	sf	85,000	0.65
untreated	lf	400	4.00
stl bear 12″74#	lf	6,800	7.50
14″102#	lf	3,500	11.75
conc cip 30 ton	lf	29,500	5.20
drive equip, furn	ls	1	4,000
Gravel fill	cy	300	7.00
Curb, bluestone	lf	1,750	6.00
conc A	lf	5,150	1.50
CS	lf	1,000	1.50
C	lf	12,200	1.55
DC	lf	300	1.65
D	lf	3,950	1.50
stl face	lf	950	6.00
Manhole A	ea	15	300.00
BA	ea	11	260.00
B	ea	1	225.00
Drop inlet C	ea	65	260.00
G	ea	10	280.00
GT	ea	4	280.00
Catch basin	ea	3	110.00
Change elev of MH & CB	ea	20	80.00
Conc sidewalk	sy	2,000	4.00
driveways	sy	520	5.50
Timber & lumber	Mfbm	5	350.00
CIP 30″ rem & relay	lf	70	20.00
Pneum proj conc	sf	1,000	3.00
Emuls carbon black	lb	32,000	0.15
Gravel fill ROB	cy	2,600	4.70
Topsoil place fr S-pile	cy	1,150	1.30
f & p	cy	1,600	5.50
Seeding	ac	5	660.00
cover crop	ac	10	550.00
Reseeding	ac	2	440.00
Planting:			
Gleditsia triacanthos-caliper			
2½-3″	ea	20	65.00
3½-4″	ea	5	105.00
Quercus borealis 2¼-3″ cal	ea	3	80.00
Pinus nigra 8-10′ ht	ea	24	50.00
Quercus velutina 2½-3″ cal	ea	6	80.00
Quercus coccinea 3-3½″ cal	ea	8	90.00
Crataegus crusgalli 5-6′	ea	3	28.00
6-8′	ea	8	33.00
mollis 5-6′ ht	ea	3	27.00
6-8′ ht	ea	6	32.00
phaenopyrum 5-6′	ea	6	32.00
8′	ea	8	38.00
Viburnum prunifolium 5-6′	ea	14	27.00
6-8′	ea	10	32.00
Lonicera japonica halliana 2 yr no. 1	ea	5,600	0.55
Lycium chinensis 2-3′ ht	ea	2,000	1.55
Demolition	ls	1	7,000
Sheet asph pvmt	sy	16,200	2.00
Stone blk surf topsoil jt	sy	7,200	8.00
mortar jt	sy	350	8.00
Timber curb "T"	lf	800	1.25
guide rail A	lf	850	7.00
B	lf	1,550	12.00
Cinders, loose meas	cy	350	6.00
Chain link fence 8′	lf	110	7.00
Metal rail A	lf	750	10.00
B	lf	300	12.00
Police telephone pullbox	ea	19	460.00
illum sign	ea	2	190.00
Conduit WI HD galv 1½″	lf	80	2.60
2″	lf	4,400	2.90
3″	lf	170	4.40
Temp light poles	ea	5	390.00
overhead wire	lf	1,000	0.35
F&p luminaire & fndn & lamppost 8S-AL	ea	35	370.00
8T-AL	ea	40	440.00
F&p lamppost 8S-AL & lum on wall	ea	5	600.00
on specl fndn	ea	2	350.00
Luminaires, f&p	ea	15	130.00
Warning unit f&p A	ea	1	140.00
B	ea	4	30.00
Conc serv box w CI frame & cover, sidewk #1	ea	1	190.00
#2	ea	16	275.00
#3	ea	39	325.00
#4	ea	4	350.00
CI box, sidewk #1	ea	3	185.00
#2	ea	3	260.00
Fuse cutout bx 8x8x6″	ea	4	120.00
equip	ea	4	10.00
Control cab, 6 relay	ea	1	1,250
equip	ea	1	1,230
pedestal	ea	1	1,500
equip	ea	1	1,700
Conduit			
HD galv stl pipe ¾″	lf	100	1.50
1″	lf	425	2.00
1¼″	lf	35	2.00
1½″	lf	130	2.50
2″	lf	80	2.40
3″	lf	400	3.40
4″	lf	80	4.60
black stl pipe 1½″	lf	500	2.15
2″	lf	2,600	2.25
3″	lf	5,000	3.00
4″	lf	150	4.20
Conduct, f&p, rubbr insul, neoprene coated, #12	lf	2,000	0.30
#6	lf	1,700	0.50
#2	lf	8,400	0.70
#2/0	lf	21,500	0.90
#4/0	lf	600	1.40
Astron time sw impost f&p	ea	15	60.00
Flex bronze hose ¾″	lf	20	10.00
1″	lf	10	12.00
1½″	lf	10	16.00
3″	lf	20	33.00
Rem CI water pipe dia 10″	lf	110	3.50
20″	lf	550	4.25
CI water P instl 10″	lf	100	3.85
20″	lf	450	6.65
f&p 6″	lf	25	7.00
8″	lf	200	7.00
10″	lf	20	13.00
12″	lf	500	10.00
20″	lf	20	37.00
Steel water pipe f&p 8″	lf	830	20.00
20″	lf	120	39.00
Valves 8″ remove	ea	1	35.00
install	ea	1	35.00
f&p	ea	1	250.00
f&p 12″	ea	1	350.00
20″	ea	1	900.00
Hydr assemblies, remove	ea	2	75.00
install	ea	2	100.00
f&p	ea	2	500.00
Corp tap 1″ f&p	ea	2	200.00
Blowoff, f&p	ea	1	800.00
Venturi meter 20″ f&p	ea	1	9,000
Traf light stand on conc fndn, install	ea	3	130.00
Traf light control stand on conc fndn, install	ea	1	150.00
Traf signal, impost, instl	ea	2	40.00
Cond stl pipe 2″	lf	275	2.40
WIP 2″	lf	50	3.00
3″	lf	550	4.00
Fire alarm post, instl	ea	1	50.00
cable 4-wire	lf	1,350	1.40
manhole	ea	1	400.00
pole term bx	ea	1	100.00
Reconst platform & canopies, Highbr Sta RR	ls	1	3,200
Suppt wall, Highbr RR	ls	1	2,200
Sheet pile bulkhead	ls	1	3,000
Gas & elect facilities	ls	1	4,700
Tel & elec'acil subwy	ls	1	2,300
Subwy facil	ls	1	1,700
Clean stone masonry	sy	450	3.25
Grease intercept, f&p	ea	1	600.00

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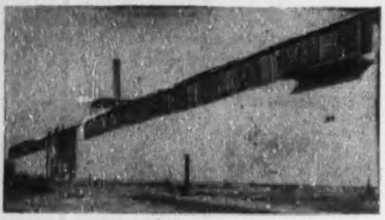
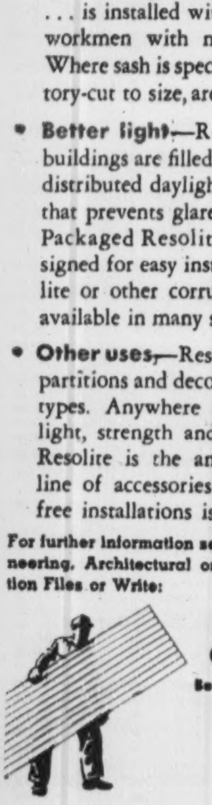
Shatterproof translucent panels save high labor cost of pane replacement . . . need no maintenance.



- **Rugged**—Shatterproof, strong as metal, fiberglass-reinforced Resolite has *unlimited* life without protective treatment or maintenance. There are no broken panes to replace.
- **Low cost**—Skylights and sidewall lights are installed at *half* the cost of regular glazing material. Resolite nests with and is fastened like any corrugated metal or asbestos sheet. It requires no special framing or flashing . . . is installed with ordinary tools by workmen with no special training. Where sash is specified, flat sheets, factory-cut to size, are installed like glass.
- **Better light**—Resolite daylighted buildings are filled with bright, evenly distributed daylight . . . diffused light that prevents glare, reduces eyestrain. Packaged Resolite vented units designed for easy installation with Resolite or other corrugated material are available in many sizes.
- **Other uses**—Resolite is also ideal for partitions and decorative facings of all types. Anywhere a combination of light, strength and beauty is desired Resolite is the answer. A complete line of accessories for easy, trouble-free installations is available.

For further information see Sweet's Plant Engineering, Architectural or Industrial Construction Files or Write:



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MUNICIPAL

Tunnel clinic

N Y project medical group to keep careful check on compressed air illnesses

A $60,000 clinic, equipped with a decompression chamber, has been provided by the New York Port Authority for examination and emergency treatment of workers on the third tube of the Lincoln Tunnel.

The installation, claimed to be the most complete medical facility ever established at a compressed air job site in the area, is located at the Weehawken, N. J. side of the Hudson River tunnel project. It is part of a $200,000 medical and safety program set up by the authority in cooperation with contractors and unions.

Examination of "sand hogs" is scheduled to start in October, about 30 days before under-river tunnel construction begins. The job will require a 200-man force working four shifts around the clock, six days a week.

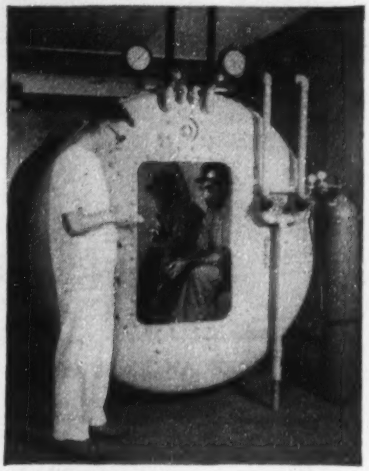
• What does it offer?—The single-story frame clinic, built by Anderson-Laudadio, Inc., New York contracting firm, is 55 by 60 ft, containing 3,300 sq ft of area and divided into 12 rooms.

In addition to the decompression chamber, the structure provides a physiotherapy room, audiometer room, X-ray facilities, surgery and examination room, a laboratory, electro cardiographic equipment and necessary office and administrative space.

Dr. Samuel I. Kooperstein, director of the authority's medical program, stated that the decompression unit in the clinic will be used for emergency treatment and for examination purposes.

The chamber in the clinic is a cylindrical steel lock, 18½ ft long and six ft in diameter. As many as eight men can be tested simultaneously for compressed air work. A glass "bull's eye" above the chamber door permits a medical attendant to observe reactions while gage pressures ranging from 5 to 15 lbs are supplied. Working pressure in the tunnel will be maintained at the higher level.

The chamber is constructed with an outer and inner lock, so that during treatment of a worker for compressed air illness, the doctor or nurse can enter and leave the chamber through the front lock without disturbing the patient in the inner lock.



DECOMPRESSION CHAMBER is prime feature of $60,000 Lincoln Tunnel medical facility.

Each section of the chamber has a separate air supply system that can be controlled from inside or outside the chamber. A maximum of 70 lbs above atmospheric pressure can be supplied to the lock in about five minutes.

Other features of the chamber include telephones in each section to provide direct communication between the workers being tested and the medical attendants. An oxygen inhalator apparatus, kept just outside the chamber, is ready for use in the lock at all times.

The medical clinic will be staffed around the clock, six days a week. Four physicians and three nurses, in addition to medical technicians, will comprise its staff under the direction of Kooperstein. One of the four doctors will be on emergency decompression chamber call Sundays and holidays.

Before operations start, the four physicians will attend a four-day indoctrination course in theory and practice of handling compressed air illnesses at the Navy Diving School at New London, Conn. This course, employing Navy diving personnel as subjects, is under the direction of Commander Gerald J. Duffner, M. C., and Dr. Kooperstein.

The clinic will provide the medical profession with what is expected to be the most complete medical record of a compressed air job in this country. It will contribute detailed reports on both prevention and treatment of compressed air illnesses.

The total annual expenditure for the authority's medical-health program is claimed to exceed $600,000.

Building code

Campaign for county-wide setup gains momentum

A 10-year campaign by builders and building officials to win a unified building code for Greater Miami (Dade County) seems about to bear fruit.

The Dade County League of Municipalities, after a year's study of the proposal, has indorsed the code project and is now trying to get the support of the municipalities concerned.

The league is composed of representatives of the county's 26 municipalities – 15 of which issue building permits–and the county government.

First municipality to approve the project and appropriate its pro-rata share of the cost of writing a unified code is Bal Harbour Village.

County commissioners have not taken official action, but individual members of the commission have indicated their approval of the project and willingness to vote the county's share of the cost. Similar expressions have come from officials of Miami, Miami Beach and Coral Gables.

It is estimated that the cost of preparing a unified code will run around $20,000, this amount to be pro-rated on a population and building permit basis.

A qualified structural engineer and staff of assistants would be engaged to write the code. Sponsors lean toward patterning the new code after the Pacific Coast Conference Code.

The plan also calls for establishment of a central office keeping the unified code up to date. This office would test all new materials and techniques submitted for adoption in Greater Miami.

The unified code has the support of professional engineer groups, architects, building officials and contractors.

$4.6 million toll bridge is proposed for Spokane

The Spokane, Wash. city council has received preliminary engineering estimates and traffic surveys for a proposed toll bridge across the Spokane River, which cuts the city virtually in half. The structure is estimated to cost $4.6 million and would be expected to carry about 3,300,000 vehicles the first year.

As proposed by the Tudor Engineering Co. of San Francisco, the

(*Continued on page 258*)

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DEEP DOWN SPOT DIGGING...

Tangible, valuable features contribute to the exceptional trench excavating of

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Basic features include: *correctly designed shells* for easy penetration and discharge—*removable counterweights* to help force the shell into material and the block and tackle principle of multiplying closing power.

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bridge would be a continuous plate girder 1,716 ft long with a vertical clearance of 180 ft. Consisting of 14 spans ranging from three of 165-ft length to eleven of 126-ft-length, the bridge would carry a 50-ft-wide roadway with four 12-ft lanes.

Traffic surveys conducted by Coverdale & Colpitts, New York, showed that many drivers now go a mile or more out of their way to avoid the congestion on existing bridges. On the basis of a 10-cent toll, earnings were estimated at $241,000 for the first year with an increasing income up to $576,000 by the 28th year of operation.

Fringe parking

Bus firm—Port Authority team up for NYC service

The bi-state Port of New York Authority has teamed with Public Service Coordinated Transport Co., of Newark, N. J., to establish midtown New York City's first fringe area parking lot with direct-line, nonstop bus connections to the core area.

The Lincoln Tunnel Parking Area, in North Bergen, N. J., will accommodate 800 cars in a 10-acre area bordering the Jersey meadowlands.

The authority will improve the property at a cost of about $400,000, providing paving, drainage, lighting, fencing, access ramps, bus shelters.

A tentative Public Service bus schedule indicates that rush-hour bus service will be available at six-minute intervals. During the intervening daytime hours, the tunnel buses are expected to run on a ten-minute schedule, and for the convenience of night-time patrons of the parking area, a fifteen-minute schedule will be maintained.

According to Howard S. Cullman, authority chairman, the project has endorsement of New Jersey's Governor Robert B. Meyner and his committee on New York-New Jersey Tunnel Traffic.

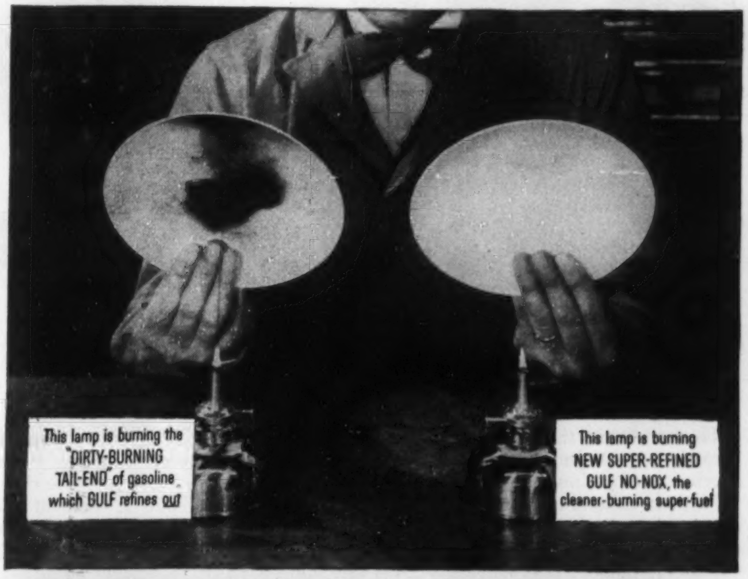
All revenues from parking charges and bus fares will be collected by the transport company. Revenues remaining after the company's costs have been met will be paid to the Port Authority until the agency's developmental costs have been recovered.

After both the authority and the transport company have recovered their costs, Public Service will pay to the bi-state agency one-half of all revenues.

(*Continued on page 260*)

Motorists: here's proof...

Gulf's cleaner-burning, super-refined gasoline solves today's No. 1 engine problem!


This lamp is burning the "DIRTY-BURNING TAIL-END" of gasoline which GULF refines out
This lamp is burning NEW SUPER-REFINED GULF NO-NOX, the cleaner-burning super-fuel

Laboratory tests promised...

. . . these *immediate* and *lasting* benefits from this new, super-refined fuel:

More complete engine protection than from the so-called "miracle-additive" gasolines. Why? Because Gulf refines *out* the "dirty-burning tail-end" of gasoline (the No. 1 troublemaker in high-compression engines)—and then treats this new Super-Refined NO-NOX to give it a *complete range of protective properties*. It protects *every* part it touches against carbon, rust, gum.

Extra gas mileage in all your everyday, short-trip, stop-and-go driving.

No knock, no pre-ignition. Why? Because the anti-knock power of new Gulf NO-NOX has been stepped up to an all-time high.

Stall-proof smoothness. Instant *starts*, too—and fast, fuel-saving warm-up.

That's why new Super-Refined Gulf NO-NOX gives your engine more power-with-protection than you've ever known.

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True! After 15,000 miles per car—covering all conditions of city and country driving—Gulf test cars showed these results:

- Higher-than-new horsepower!
- Better-than-new on gasoline mileage!
- And not a single trace of carbon knock or pre-ignition at any time—even on the steepest mountain grades!

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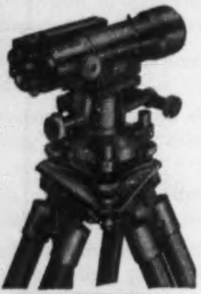

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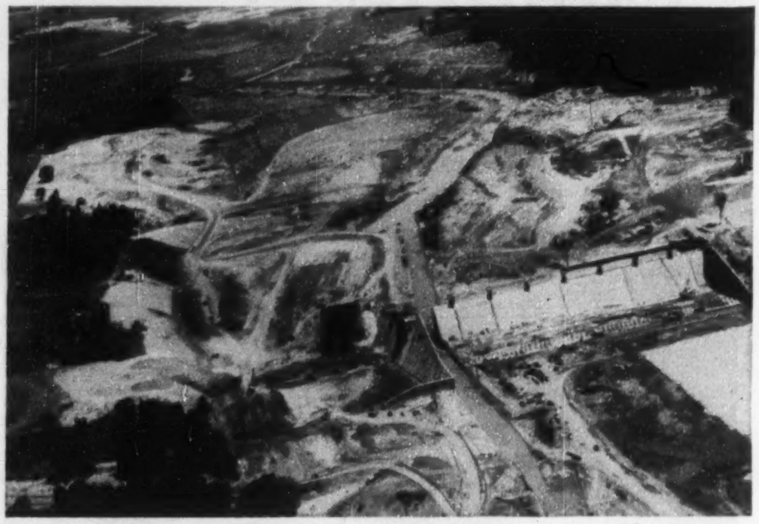


City dam project nears completion but reservoir use will be delayed

Hoover Dam, the barrier that will throttle Big Walnut Creek, 12 miles northwest of Columbus, and impound 27 billion gallons of water for future use of Ohio's capital city, is three month's ahead of schedule (ENR, Aug. 13, 1953, p. 50).

The $6.7-million dam will be completed in early 1955, but impounding may not start until late spring because relocation of roads cannot be completed before mid-year.

• **What's it going to cost?**—The cost of making 50 to 57 million gallons of water available daily for the use of Columbus residents will exceed $25 million, according to latest estimates of Ben K. Bare, engineer in charge for Burgess & Niple, consulting engineers.

Included in the cost are: Acquisition of land, $3.5-million; eight road relocation projects and a new bridge, $3.5 million; three pipeline jobs—the first to be ready for bid on Oct. 5, $4.4 million; a 60 mgd filtration plant, $6.5 million; and the added cost of 8-ft-high crest gates not included in the $6.7 million cost of the dam.

Hoover Dam is a compacted earth fill embankment with uncontrolled concrete gravity section spillway. With the proposed 8-ft crest gates, the dam and spillway will have an overall height of 118 ft.

The reservoir will cover 3,800 acres, some of it as much as 80 ft deep. The impounded lake will be eight and a half miles long and three-quarters of a mile wide, serving a water shed area of 190 square miles.

To complete the embankment, 700,000 cu yd of earthfill and 130,000 cu yd of rock are going in. The dam, 2,525 ft long by 650 ft wide at the base, will contain upon its completion, 550,000 cu yd of compacted earth fill, 80,000 cu yd of protection stone and 177,000 cu yd of concrete.

General contractor for the dam is J. A. Jones Construction Co., of Charlote, N. C., with E. F. Biggs as project engineer. On the job for Burgess and Niple, besides Bare, are Robert Tippett, the consultants' engineer in charge of bridge and roads and Tahlman Crum, project engineer.

The bridge is being built by Visintine & Co., and road contracts so far awarded are being handled by Nix, Inc., George Sheaf & Co., Red Eagle Corp. (all of Columbus) and Braden and Walters, Marietta, Ohio.

City needs 28 engineers

Cincinnati's city manager has asked council authorization to hire 28 additional engineers to expedite preparation of plans for the city's expressways program.

To help overcome the difficulty in recruiting this many engineers, the city manager has recommended an upward revision in pay schedules. The added personnel would cost approximately $150,000 a year in salaries, $120,000 to be paid out of expressways bond money. The remainder for vacations and sick leaves, must be met out of the general fund.

(*Continued on page 263*)

● *There's this about Erie Strayer Equipment...*

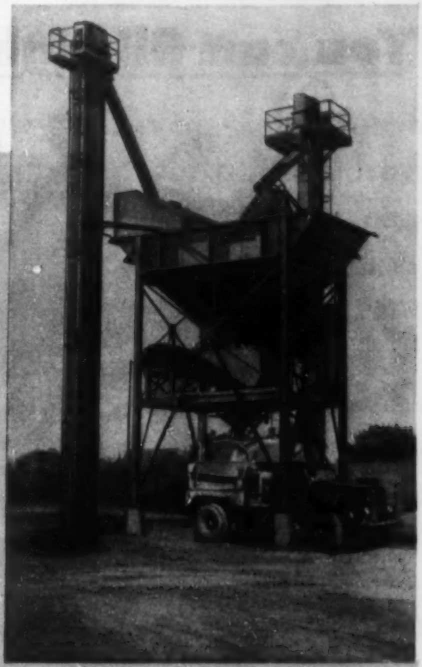
EVERY UNIT IS A CUSTOM-BUILT PACKAGE MADE FROM STANDARD, PRODUCTION PARTS

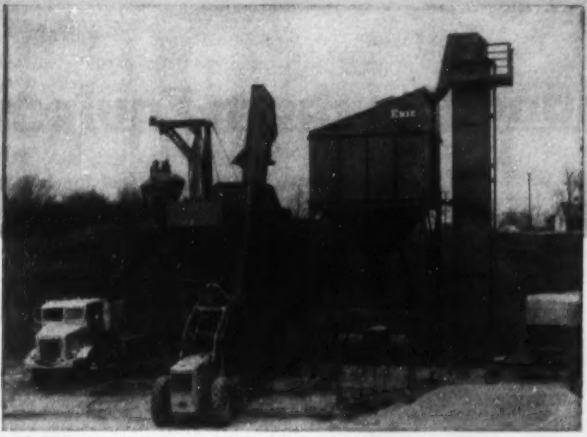
This means a lot both in immediate and long-range benefits. Equipment engineered especially for your particular needs is bound to give you more efficiency. That's the purpose of engineering. And being made from standard parts means quick service on replacements when you need them. Keeps your equipment going—avoids costly down time.

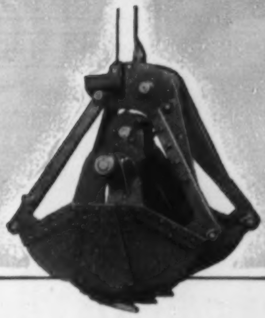
Since 1912, owners of Erie Strayer bins, batching and mixing equipment have enjoyed these money-saving features. In today's highly competitive market, equipment that cuts cost goes a long way toward keeping you in the running, when you have to "sharpen your pencil."

Instead of bidding against these advantages why not let them bid for you! Before you decide, see Erie Strayer.

WRITE FOR BULLETIN AP-1







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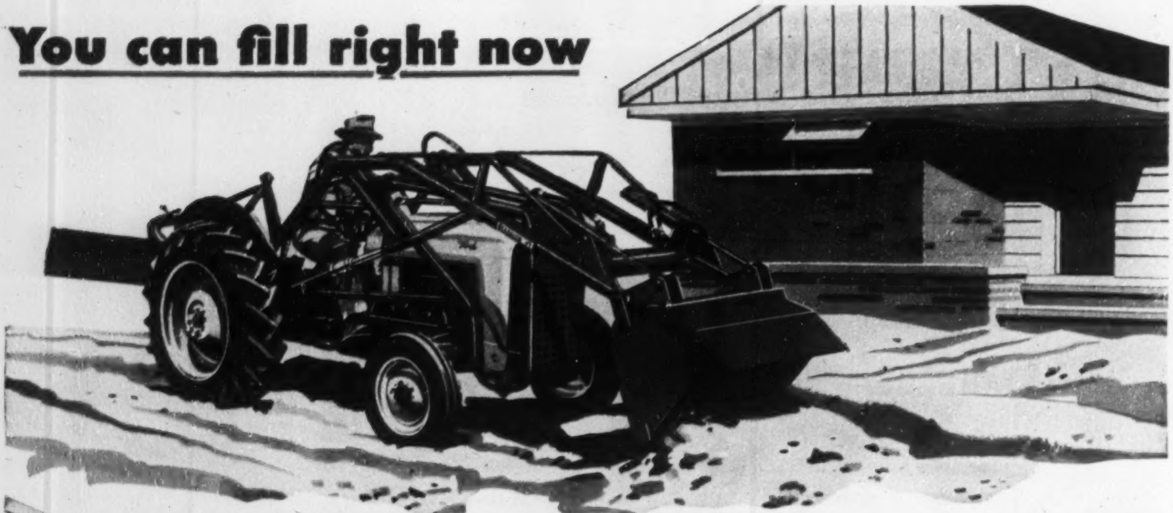
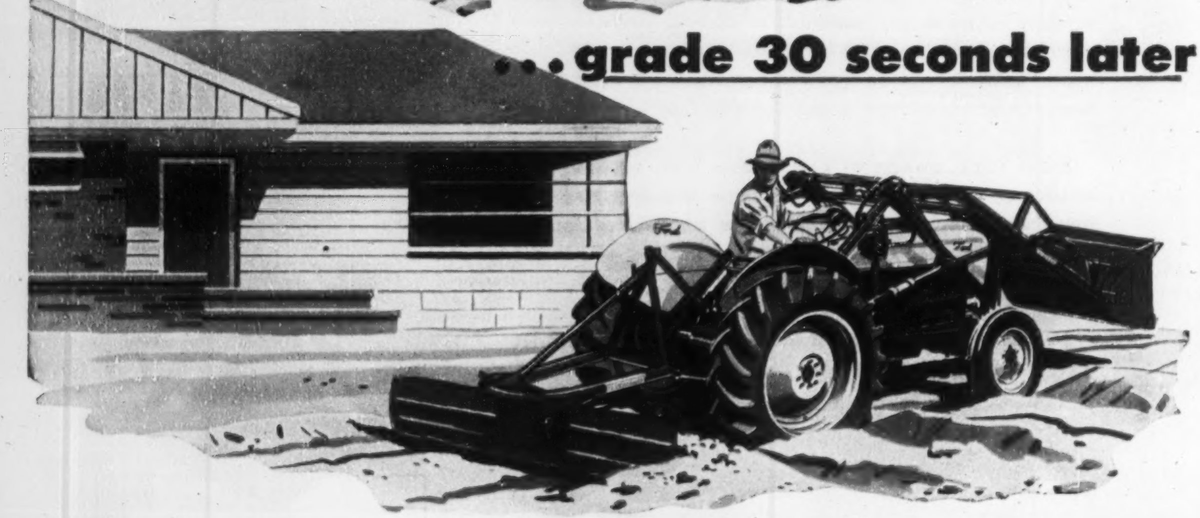


. . . grade 30 seconds later



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Civil Defense Job

Water line rushed to aid drought-stricken city

Civil Defense authorities recently came to the aid of Gastonia, N. C., after a summer-long drought reduced city water levels to a point where an industrial shut-down threatened the city's large textile center.

Ten miles of pipe for temporary lines were trucked to Gastonia from Civil Defense stockpiles in Birmingham, Ala. The emergency lines were calculated to add 2.5 mgd of water to the city's supply. They were laid out along Long Creek from South Fork River to the city reservoir at Rankin Lake with six pumps along the way. The city engineering department handled the operation.

Gastonia's normal water consumption of between 5.5 and 6 mgd was restricted to 4 mgd by the city council, which declared the state of emergency. Some local industries depend entirely on the public water supply. Others have their own water supplies but depend upon the city for a portion of their demand. Effects of the shortage also have been felt in several nearby towns that buy their water from Gastonia.

Army engineers first had been called upon to see what emergency measures they could take. However, they were unable to act in this situation because industries still were using the water and no human life was threatened. The assistance of the Civil Defense then was asked.

All of the pipe and five of the CD pumps shipped to Gastonia were sent from Birmingham and another pump with auxiliary equipment was sent from East Point, Ga. Twenty-six trucks were used.

Col. Harry E. Brown, regional CD director, and Earl Mader, a CD engineer, flew to Gastonia to assist in placing the equipment.

Twin 8-in. lines, laid from the South Fork River to Gastonia, follow a right-of-way of the Duke Power Co. reaching the river near Spencer Mountain.

The pipe was laid on the surface. Where it crosses roads, traffic has been ramped over the lines. Construction crews had to tunnel under railroad tracks at one point.

The city recently laid a one-mile line to Rankin Lake from the junction of two streams, with a resulting 15% addition to its supply facilities. It plans now to get permanent relief

(Continued on page 264)

Short Story—Valuable Reading!

Here's a contractor who saved plenty on a big job, using Universal's Ezebilt Scaffolding. He needed just 832 Braces (and 1648 connections) in this scaffold run—*single braces,* instead of cross-braces in 70 to 85 per cent of the spans. By being able to use single-bracing on six out of every seven spans—this contractor saved at least 60 seconds *for every brace he did not need,* or for each cross-brace he would have had to use with ordinary scaffolding. And more—Ezebilt's fast-connecting 'Gravity-Lock' mechanism also saved him 20 seconds on every brace-connection. Small Talk? No—not when you multiply the seconds by hundreds and thousands! This man, by using Universal Ezebilt Scaffolding, *saved many hours on this single job.* In dollars and cents—it made sense for him to use the one scaffolding that allows such savings.

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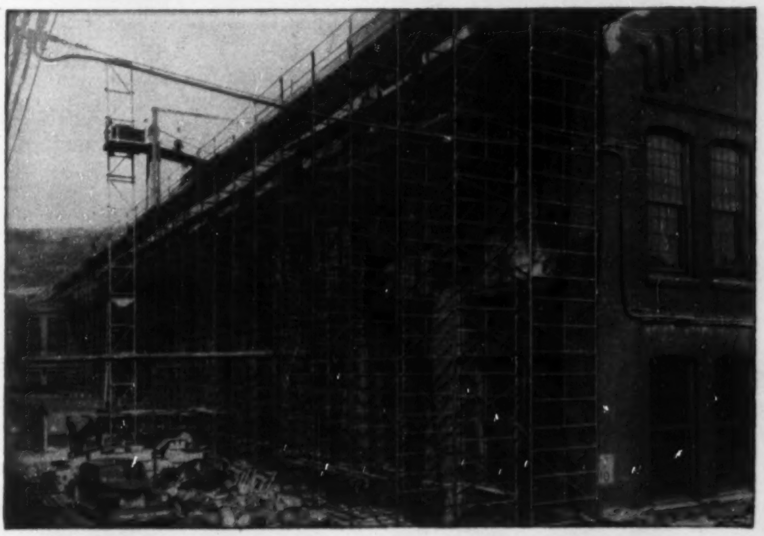

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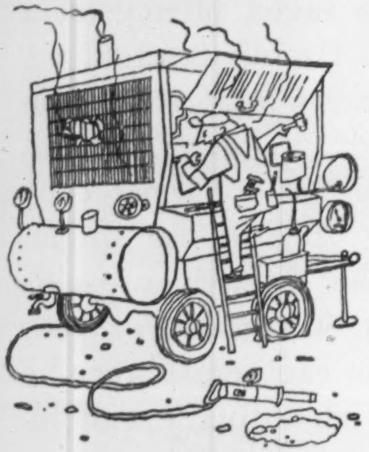

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by installing a 36-in. water line from South Fork River to the reservoir.

By September 13, the water level in Rankin Lake had dropped to a 38-day supply; water rationing is required by law under such critical conditions.

Many rural areas in North Carolina have been critically affected by low stream levels and dry wells. At Red Springs, the Robeson County Commissioners named a committee to study the possibility of hiring the services of professional rainmakers.

In Rutherfordton, Spindale and Forest City, farmers are selling cattle to avoid losses due to water shortages, and the water situation in Valdese has been listed as critical.

Many other towns have called upon citizens to conserve water on a self-imposed ration system.

Annexation policy

Denver requires land or cash from new additions

In annexing a 598.7-acre partly-developed residential area, Denver, Colo. has inaugurated a new "buy in" policy that requires property owners in new areas to donate to the city 8% of the addition's land area or its cash equivalent to offset the cost of public buildings, parks and municipal services.

The newly-annexed area, known as Virginia Village, has 599 homes. One developer is now building 320 homes on an 80-acre tract and another is putting up 176 houses. Together the two builders donated 49.14 acres of undeveloped land to qualify the area for annexation. The donated land, in two parcels of 32 acres and 17.14 acres, becomes city property, although it is not being annexed. The city may develop it for parks or schools.

The developed area has nine miles of water mains that will become city property with annexation. Builders must put in walks, streets, sewers and water mains in all new developments. The city will provide street maintenance and lighting.

Residents of the annexed area, who now pay Arapahoe County taxes, will start paying Denver taxes in 1956. At present rates, they will be paying an additional $2.26 per $1,000 valuation. Proponents of annexation could point to a number of advantages to offset the slight tax raise. Water costs will be reduced substantially through the action. Fire underwriters said that insurance rates will be reduced by about two-thirds. (But, until hydrants are installed within 1,000 feet of any residence, trucks with water tanks will be stationed nearby). Denver police patrol cars were assigned to the annexed area.

A problem remains for some property owners who were residents of two Arapahoe County school districts that recently voted bond issues for new schools. These persons will have to pay a tax of $5.50 per $1,000 of assessed valuation for schools their children will not attend. The Denver public school system will provide buses to Denver schools until others are built to accommodate Virginia Village children.

Charter change needed for excavation permit

Webb & Knapp, Inc., New York realty firm, is trying to clear legal technicalities in order to begin construction this year of its proposed $28-million hotel and store development on Courthouse Square, in downtown Denver, Colo.

Arthur G. Rydstrom, vice president in charge of western operations, asked the Denver City Council for an irrevocable permit to excavate under Court Place, the street along the eastern side of Courthouse Square. He said the plan is to extend the three basement levels under the Courthouse Square building to other buildings and parking areas to be constructed across Court Place by W&K.

The council told Rydstrom that only a charter amendment adopted by voters could grant an irrevocable permit. W&K officials said that they would probably try to place the proposed amendment on the Nov. 2 general election ballot.

Rydstrom said that a lease signed with Daniels and Fisher Co., which will occupy an 8-story department store building on the square, stipulated that construction was to begin this year.

Rydstrom added that his company is still negotiating with several hotel firms for operation of the 14-story, 1,000-room hotel to be built on the same block.

$26 million port project recommended for Toledo

Construction of a $20.6-million general cargo terminal and development of a $5.9-million waterfront recreation area for Toledo, Ohio, has been recommended in a port study made by Harland Bartholomew & Associates, St. Louis consultants.

The terminal would be located at the mouth of the Maumee River, ad-

(Continued on page 266)

UNIVERSITY OF KANSAS BUILDS NEW FIELD HOUSE: More than 2,700 tons of structural steel went into the framework of new field house at the University of Kansas, Lawrence, Kansas. The structure features 10 rigid frames which provide a clear span of 250 feet. The frames, which weigh 80 tons each, are completely welded, and were produced simultaneously in Allied's three plants at Chicago, Illinois, Hammond, Indiana, and Clinton, Iowa. The three plants worked on a schedule that permitted shipments to be made in a prearranged sequence (about 10 days apart), with frames arriving in Lawrence, Kansas, as needed by erection crews. The new building, completed in March, 1954, is used as an armory and for physical education purposes. It has a seating capacity of 15,490 people.

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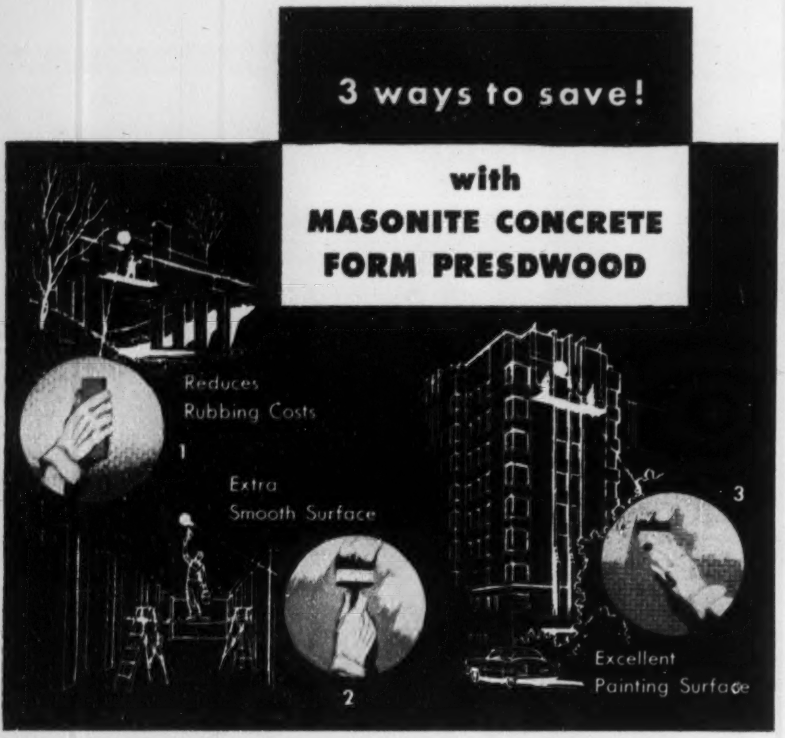

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jacent to the Presque Isle docks, and the recreational area would be laid out on the western shore of Maumee Bay, according to Bartholomew.

The long-range program for development of Toledo as a seaport as well as a lake port was outlined by the consultant at a joint meeting of the city council, the Toledo-Lucas County Port Commission, county officials and more than 75 businessmen.

According to the report, when the seaway is completed, Toledo's general cargo tonnage is expected to increase from the present 15,500 tons per year to 1.5 million tons by 1980. The existing general cargo capacity of the port, even assuming optimum operation, is held by Bartholomew to be wholly inadequate to meet this future need.

The total tonnage, exclusive of potential foreign tonnage resulting from the Seaway, is expected to increase from 30 million tons in 1951 to 57 million tons in 1980, chiefly in coal, iron ore and petroleum products.

"Gold Coast" job

Luxury resort in first stage of 20-year program

There is plenty of activity in a four-and-a-half sq mi tract of land at Ft. Lauderdale, Fla., that is said to be the last primitive stretch of mangrove and palmetto wilderness on the Sunshine State's "Gold Coast" stretching for 75 miles from Miami to Palm Beach.

New canals are being dug, land is being cleared under a long-range program that will cost $4 million and approximately 30 of a projected 100 miles of roads have been laid.

The tract was bought in October, 1953, by James S. Hunt and Stephen A. Calder for $19,389,000, said to be one of the highest prices paid for a piece of undeveloped land in this state of spectacular real estate transactions.

Hunt and Calder, partners in the firm of Coral Ridge, Inc., estimated that the improved land will be worth $100 million, and that when the 20-year development is completed it will represent a total valuation of $1 billion.

• **Here's what is planned**—One feature of the 20-year-plan is the proposed construction of 25 luxury hotels. Coral Ridge now is negotiating with several hotel owners to get something started on this score.

Under way are a $4 million country

(*Continued on page* 268)

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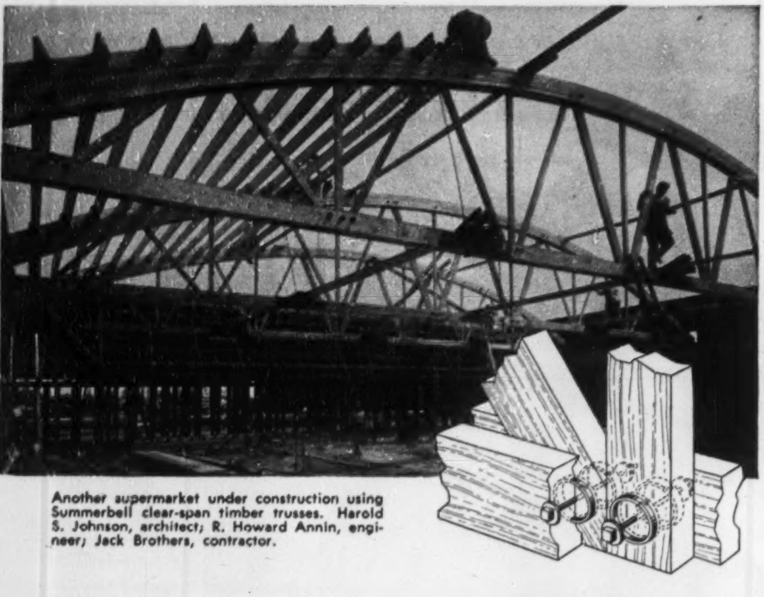

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club with an 18-hole golf course; a $1 million beach club; the Holy Cross Medical Center, a $1.2 million project; a shopping center, motels with swimming pools, roadside restaurants and retail stores.

The Southern Bell Telephone Co., whose $2.5-million building in the center of the business zone is nearing completion, has estimated that it will have 58,000 phone subscribers by 1965.

Roads and paving, when completed, will cost $3.5 million, and the dredging of 20 miles of canals will cost $1 million. To date over a million cu yd of sand have been dredged with approximately 5,000,000 to go.

Coral Ridge estimates that between 8,000 and 10,000 single family residences will be built.

Sewer district told no free admissions

"Apply for annexation, pay an extra service charge—or no treatment" was the answer in a nutshell of Mayor Andrew Broaddus, of Louisville, Ky., when he was asked by the Metropolitan Sewer District to determine basic policy on treatment by his city of sewage from a proposed Shively, Ky., municipal sewer system.

The MSD had withheld acting on the request of the suburban town until the mayor had decided upon a general policy to cover new out-of-city users.

Mayor Broaddus pointed out that a new $6-million sewage treatment plant will be built by general obligation bonds to be paid off by the taxpayers of Louisville and that city residents also paid for existing sewer lines. "I do not believe that I have the right to let other incorporated communities or individual users outside the city use these facilities unless they help pay for them," he explained.

The mayor said he had gone no further than making a determination of basic policy. There has been no decision on whether an extra charge would be paid directly to the city or to the MSD, or whether it would be in the form of an initial tie-in fee or a regular monthly usage surcharge.

The city is financing the $6-million plant itself, but the MSD is financing the cost of interceptor sewers linked to the plant. The sewers will cost an additional $6 million, it is estimated.

Municipal briefs . . .

• **Needed . . . a lot of railroad**—Immediate need for $172 million in transit

(*Continued on page 270*)

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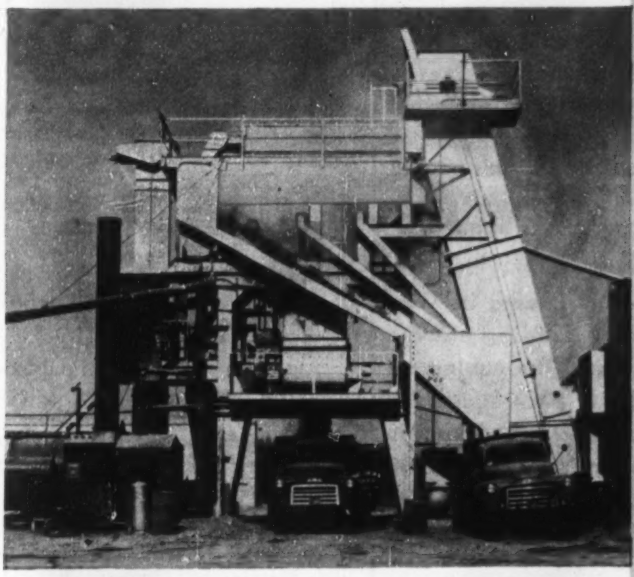

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improvements was asserted by the New York City Transit Authority as a budget requirement for the next year. The authority gave high priority to the completion of work tying in the former Rockaway branch of the Long Island RR with the city's rapid transit system. It also stressed rehabilitation of several lines and modernization of the system's power plants.

• **Revenue bonds for water**—Kansas City, Mo., councilmen have authorized the sale of $12 million in water revenue bonds that will be used to increase capacity of its north plant to 210 mgd, to construct a flood-proof pumping station and to improve the distribution system.

• **Seven buildings coming down**—Seven store buildings in downtown Montgomery, Ala., will be razed in October to provide a 26,000 sq ft parking area for shoppers. The area will be blacktopped for immediate use, but future plans call for parking decks to be added as required at an estimated cost of $75,000 per deck.

• **Good news for Buffalo parkers**—The Buffalo city council has approved start of work on two downtown parking garages. The John W. Cowper Co., Inc., will do general construction on both on its low bid of $1,186,700.

• **First multi-story garage**—Jacksonville, Fla., will have its first multi-story parking garage some time next year, according to the Model Land Co., of St. Augustine which owns and operates the Ingraham parking garage in Miami. The firm has bought several adjoining parcels of downtown Jacksonville property, and expects to invest about $1 million.

• **Federal money for town planners**—Upon the recommendation of President Eisenhower, Congress has appropriated $1 million to be used by state planning agencies to stimulate and encourage cities of less than 25,000 population to undertake comprehensive planning programs. While not yet in actual operation, the program is receiving plenty of attention.

• **Ask aid for treatment plants**—Several smaller Ohio towns have claimed inability to comply with orders of the Ohio Water Pollution Board to build sewage treatment plants, and have asked that the state finance research to find a more economical method of disposing of sewage. Meanwhile, a committee is reviewing the need for modifying the anti-pollution laws.

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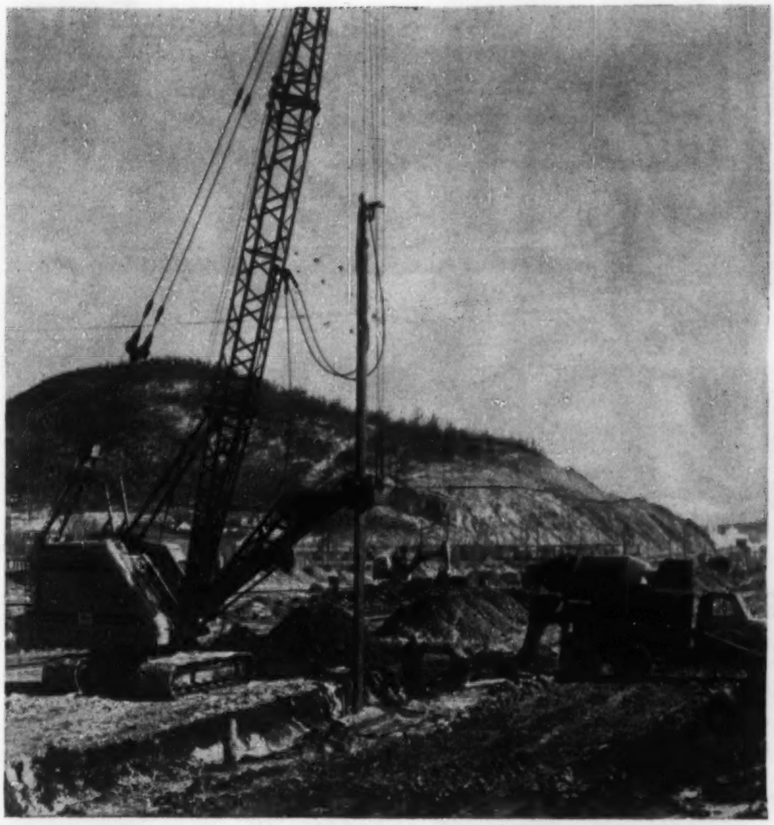

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Bidding on the basis of boring and belling foundation holes with a Gar Wood Foundation Borer, Hughes-Foulkrod was awarded the job of installing 457 reinforced footings for a new $12 million freight car repair shop now under construction near Hollidaysburg, Pa.

The new 2,700 by 270 ft. building, which will be used to repair, clean and recondition up to 50 freight cars per day, is being constructed on filled land. The 4 to 5 ft. dumbell-shaped footings are being sunk to an old river gravel strata lying 18 to 20 ft. below the surface to support the 6 to 8 ton per sq. ft. bearing load of the building.

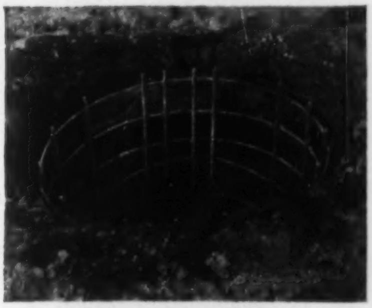
The footings are being belled at the bottom in diameters up to 7 ft. 8 in. and are topped by caps up to 6 ft. 4 in. in diameter.

Use of the Gar Wood Foundation Borer has eliminated forms, mat footings and backfilling—and the job crews have completed as many as 8 footings per day including the placement of reinforcing cages and concrete.

Any standard or heavy-duty Gar Wood excavator can be factory equipped with this time and money saving attachment for boring drilled-in-place foundations. No heavy excavating or concrete handling rigs are necessary. See your Gar Wood distributor for complete details.

1. Drilling bucket is positioned over guide and cutting edges bite into the earth.

2. Clean, round hole is quickly excavated. Hole can be belled at the bottom if desired.



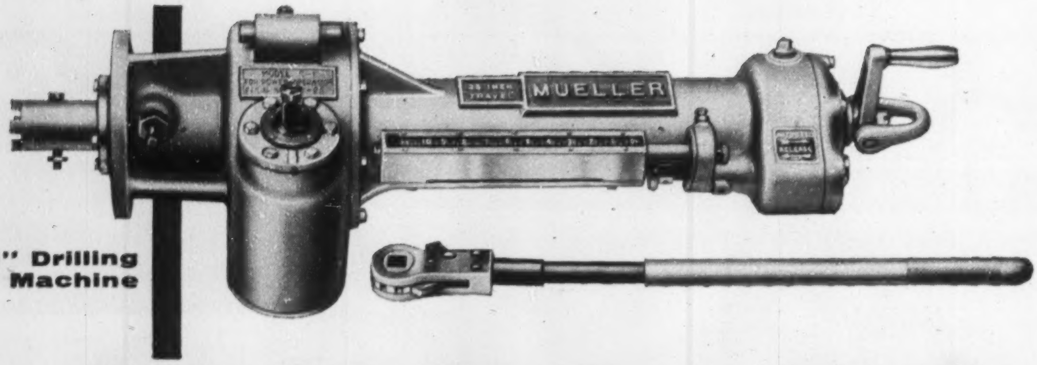
3. Pre-fabricated reinforcing cage is dropped into hole.

4. Concrete is chuted into the footing to complete the job.

GAR WOOD INDUSTRIES, INC.

WAYNE, MICHIGAN

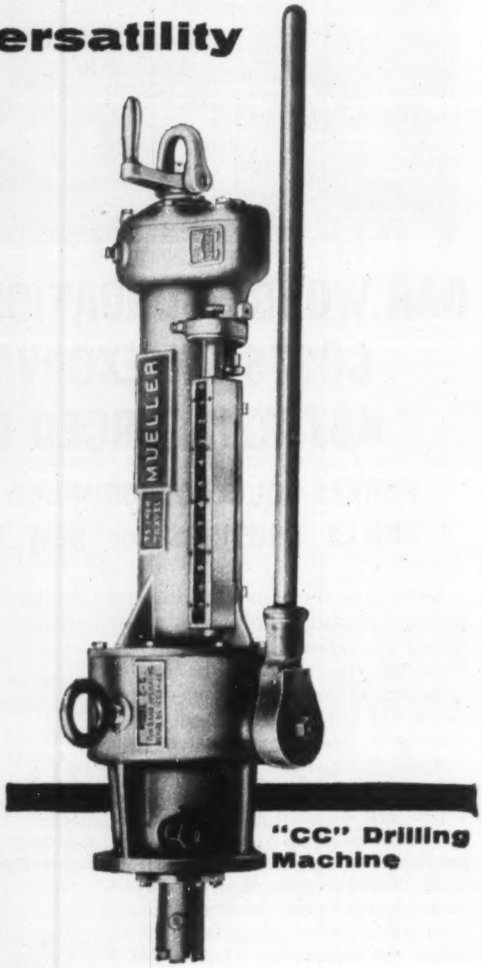
No. 5315



"C-1" Drilling Machine

MUELLER®

Proven Design Gives Versatility



"CC" Drilling Machine

Install needed valves and connect branch mains, under pressure, with a Mueller "CC" or "C-1" Drilling Machine!

Versatility has been carefully designed into the "CC" and "C-1", permitting their use with Mueller Inserting Valves, Tapping Sleeves and Valves, Gate Valves and special fittings to perform a wide variety of water works operations.

Both machines are similar in design and construction except that the "CC" is hand operated and the "C-1" is power operated by an air motor or portable gasoline engine drive unit. They constitute part of a complete line of drilling and tapping machines designed to meet your every need.

Consult your Mueller Representative or write direct for complete information.

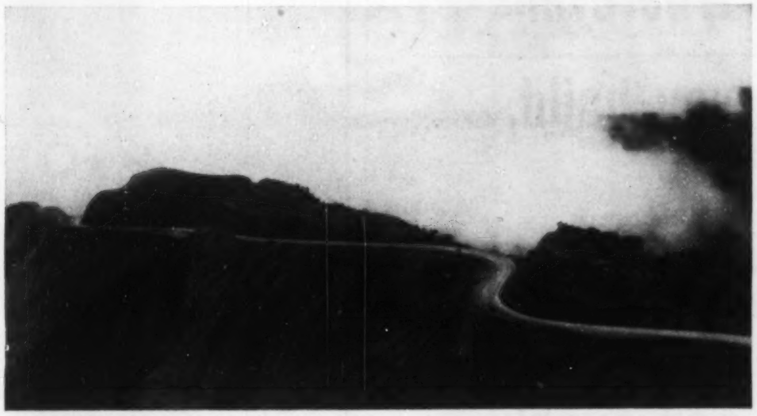
SPECIFICATIONS

Makes cuts 2" through 12"
500 psi maximum working pressure at 100°F.
500°F. maximum temperature rating at 250 psi
25" boring bar travel
Automatic or manual feed
Feed indicator standard equipment

MUELLER CO.

Dependable Since 1857

MAIN OFFICE & FACTORY DECATUR, ILLINOIS



WINDING through cloud-topped hills a mile up, the new highway drops around 10,000 ft in a 200-mile stretch.

ALMOST TWO AND A HALF MILES UP, 47 miles east of Cochabamba, Bolivia's new highway starts winding down the eastern slope of the Andes towards Santa Cruz 265 miles away.

New 312-mile Bolivian highway in Andes opened a decade after surveys started

Bolivia's brand new Cochabamba-Santa Cruz highway, on the high east slope of the Andes Mountains, was officially opened late last month.

Detailed planning for the tough project was done by a U. S. Bureau of Public Roads team back in 1943, and contract for construction was let in 1945. However, the original contractor found the shortage of materials and equipment so difficult to cope with that work shut down in 1947. A loan from the U. S. Export-Import Bank in 1950 revived the project and work resumed under a new contractor (ENR October 2, 1952, p. 28). The whole job has cost around $40-million.

The highway starts at Cochabamba in the rich mining district of Bolivia's "altiplano" at an elevation of 8,460 ft, and rises 47 miles eastward to a maximum elevation of over 12,000 ft. From that point the route winds through the mountains down to the warm plains around Santa Cruz at an elevation of 1,574 ft.

When work was shut down in 1947, only 25% of the highway was complete. The new contract negotiated in 1950 covered 174 miles of grading and drainage, 196 miles of base course, and 261 miles of asphalt paving.

(*Continued on page 274*)

HOW TO HANDLE
WET JOBS

WATERWORKS
SIPHON
Kent, Ohio
Contractor: Engstrom & Wynn

PART-TIME PUMPING DRIES JOB QUICKLY, CUTS COST

How IMPORTANT is the engineering factor in wellpoint work? This job is a good case in point.

- Soil was coarse sand, overlying an undulating clay base, top of clay being close to subgrade. Confronted with these conditions, contractor quite naturally figured pre-drainage on a basis of continuous pumping 24-hours-per-day.
- Griffin engineers, however, devised a unique layout, using special-screen points and special placement. With this layout, plus careful supervision, the job was speedily dried with only 9 hrs pumping per day (thus bringing operating and fuel costs far below estimate). Yet results were so thorough that drainage influence extended to dewater all footing excavations in the surrounding area.

GRIFFIN
WELLPOINT CORP.
881 East 141st Street, New York 54, N. Y.
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In Canada: Construction Equipment Co., Ltd.
Toronto Montreal Halifax

Darex AEA
CONTROLLED AIR
the 5th ingredient in CONCRETE
ダレックスAEA の 使用方法

Wherever you build,

Ready-Mix Plants

can supply air-entrained

Concrete

made with

Darex AEA

DAREX AEA is the world's most widely used brand of air entraining agent. Not a by-product, it is specifically formulated to do just one job; help you get superior results. Concrete made with DAREX AEA will save you money because it places easier, finishes faster and better, has finer surface texture, is more durable.

Ask your nearby Ready-Mix plant for concrete made with DAREX AEA to insure the full benefits of air entrainment.

D A *Construction Specialties Division*

DEWEY and ALMY Chemical Company
Cambridge 40, Mass.

OFFICES OR SUBSIDIARIES IN Buenos Aires, Chicago, Copenhagen, London, Melbourne, Milan, Montevideo, Montreal, Naples, Paris, San Leandro (Calif.), São Paulo, Tokyo.

DARASEAL concrete curing compound • **DARACONE** masonry water repellent • **DARALITE** for lightweight aggregate

MODERN road-building equipment, working in steep cuts, had to reach the highway from Chile's port of Antofogasta via an 800-mile narrow gauge railway.

The project represented a sizable construction feat in view of the inaccessibility of the new highway. All materials and equipment for the work had to be brought in 800 miles by rail from the Chilean port of Antofogasta to Cochabamba, and then hauled progressively longer distances along the highway as work progressed towards Santa Cruz.

Bolivia, economically crippled because of sagging tin prices, desperately needs the new highway to bring the agricultural wealth of its eastern Amazon Basin lowlands to the markets of the "altiplano". High up in this mining district there is hardly any vegetation or fuel, and almost all consumer supplies must be brought in. The new highway will serve as the backbone of an extensive network of feeder roads necessary to further development of the mining area.

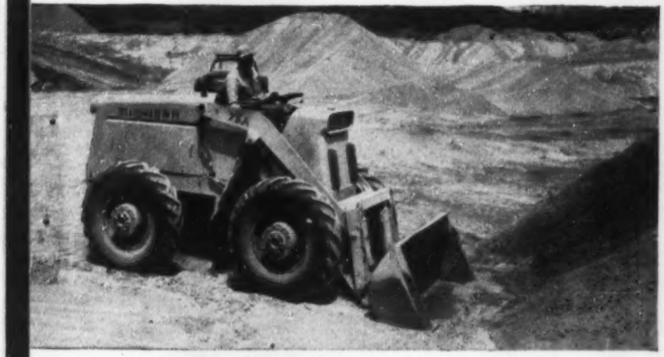
Daily bus service is now being run between Cochabamba and Santa Cruz. Scheduled time for the trip is 12 hours, as opposed to the three or four days it used to take on the old wagon road, which was often impassable for months at a time in the rainy season.

Earlier work on the highway had been carried out at first by Compania McGraw-Warren, S.A., and until 1950 by the Bolivian Development Corp. The second start on the project and its completion was carried out by the Macco Panpacific Co., Paramount, Calif., with Knappen-Tippetts-Abbett-McCarthy, New York, as consultants and construction supervisors.

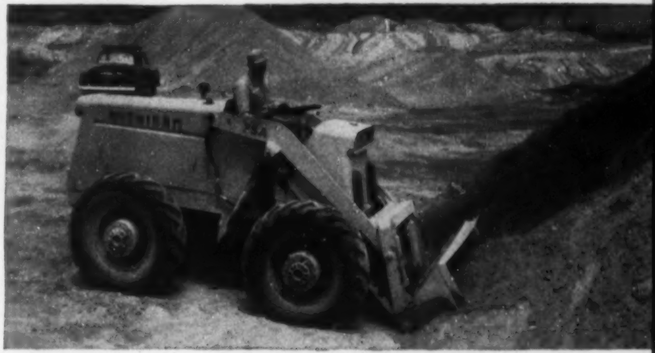
(International continued on page 276)

A heaping bucket every time!

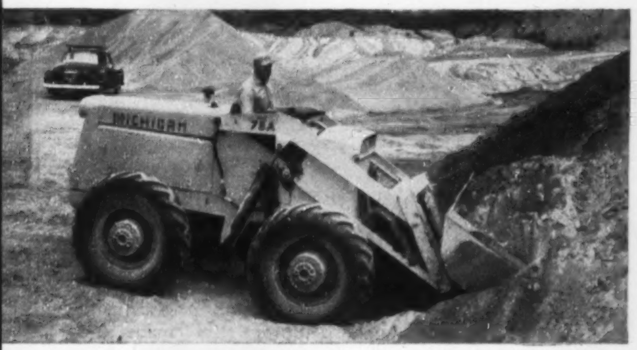
WATCH THIS.......



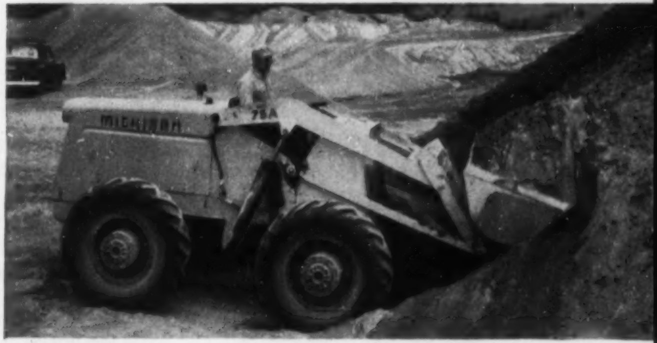
1 Watch this amazing bucket action—just flip the direction lever to "Forward" and step on the gas



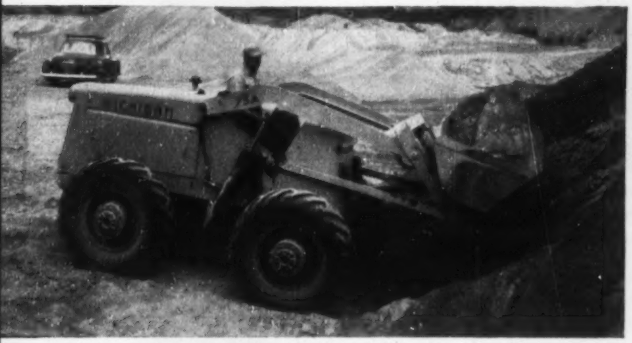
2 Digging in—the torque converter delivers smooth, steady power. Note the tread-marks—no wheel spin



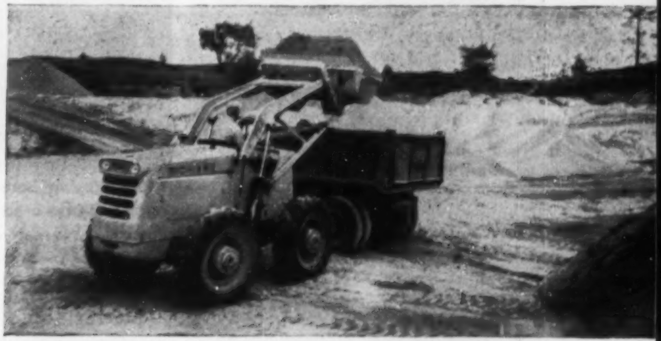
3 Roll back the heaped-up bucket—tip-back action where it counts: *in the pile*



4 Lift the bucket clear, hold it level—that heaped-up load is well over a cubic yard of material



5 Back out—flip the lever to "Reverse" and step on the gas; no clutch, no gear-shift, no wasted time



6 Dump the load, back away, and hustle in for another heaping bucket—makes short work of loading a truck

You get a full bucket every pass with a MICHIGAN . . . and more passes every hour. Result: bigger yardage! For a real convincer, have a demonstration on your job—your MICHIGAN* dealer will arrange it. Let's make a date—send the coupon on your letterhead.

*A Trademark of Clark Equipment Company

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
390 Second St. • Benton Harbor, Michigan, U.S.A.

20

Have your dealer make a date to demonstrate the MICHIGAN Tractor Shovel

Name________________ Title________

Firm________________

Address________________

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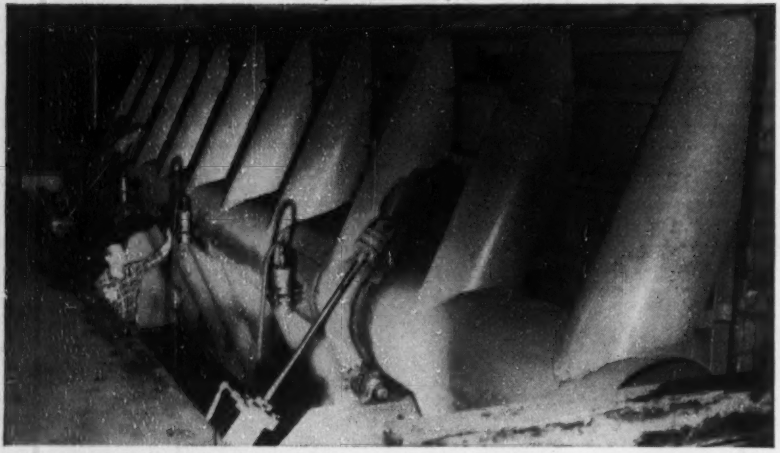
(Advertisement)

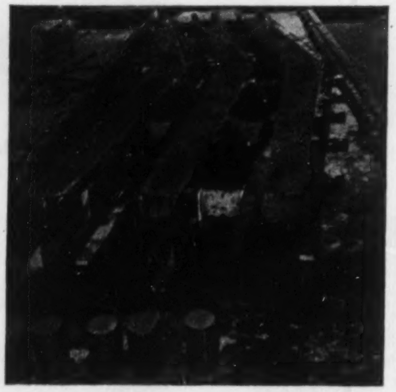


THREE VIBER MODEL PX external vibrators consolidate ½ to 1 inch slump concrete in 1 to 4 minutes. Table, shown tilted to vertical position for stripping, is capable of handling wall panels up to 39 feet, 6 inches long and 9 feet, 2 inches high.

Vibrators produce high strength lightweight panels and beams in 1 to 4 minutes

FAST, ECONOMICAL, and thorough consolidation of the concrete is accomplished by Viber PX pneumatic external vibrators located on the under side of the casting table. Three vibrators adequately handle the 40 foot table, requiring about 1 minute of operation for 6 inch slabs, and 4 minutes for 3 inch slabs. Steel casting tables under vibration assure smooth concrete.

- **The casting** table is used in a similar manner for beams and columns, requiring approximately 2 or 3 minutes of vibration. Only the top is troweled, other surfaces need no troweling.
- **When removing** a panel, the casting table is tilted, placing the panel in vertical position for stripping. Throughout the curing process and all loading operations, panels are handled vertically, avoiding stresses that would be created by lifting from the horizontal position.
- **Basalt Rock Company, Inc.,** Napa, California, has had many years experience in the manufacture of lightweight concrete products and are leaders in the field of factory assembled pre-cast concrete wall panels, roof slabs, beams and columns.



TABLE, shown here with forms for three beams, is also used for casting beams and columns. Note test samples which are vibrated at the same time.

For further information on Viber's complete line of internal and external vibrators, contact your authorized distributor of Viber Company, 726 South Flower Street, Burbank, Calif., Dept. 67.

VIBER

CONCRETE VIBRATORS SINCE 1931

Havana expansion

Tunnel and suburb project in Cuba to get underway

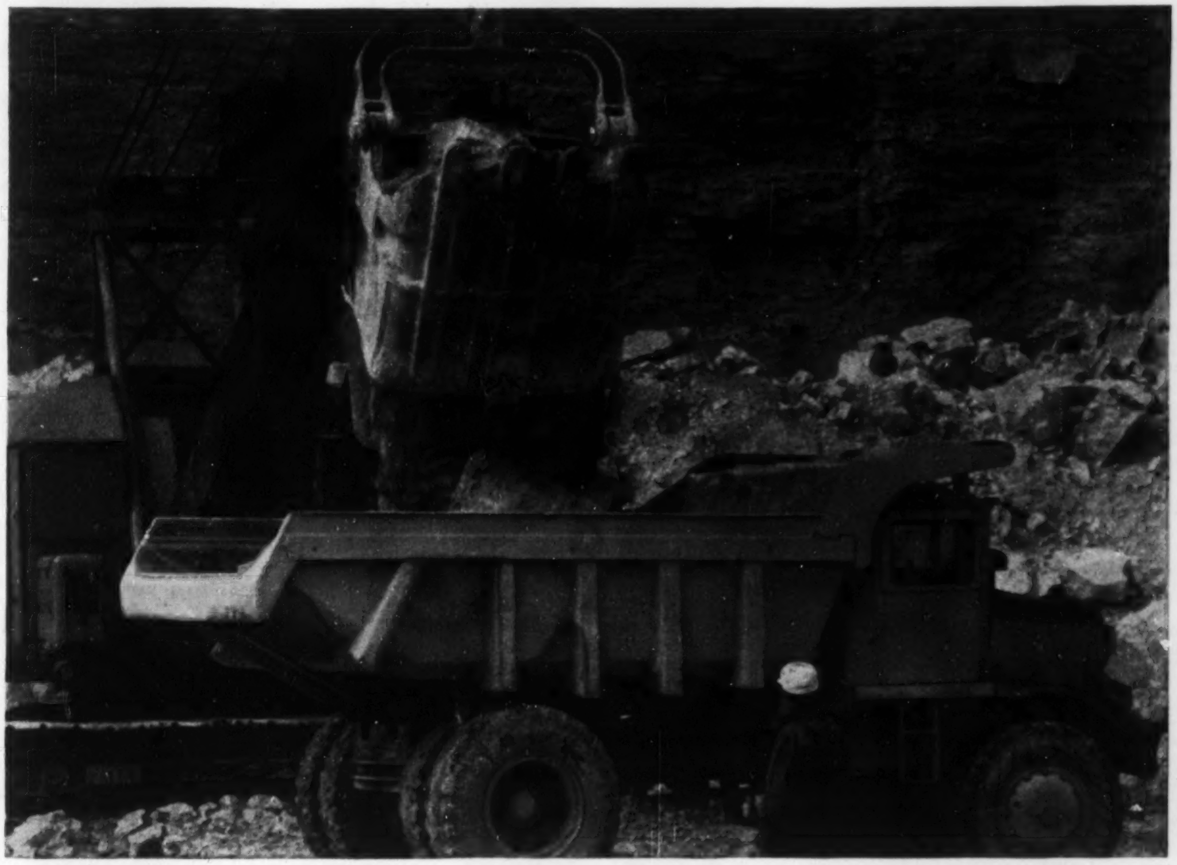
In Cuba, preliminary studies of a proposed tunnel under Havana Bay to Morro Castle and a planned residential and business suburb are scheduled to start immediately. The tunnel may cost anywhere from $20 to $36 million, depending on whether a one-tube (two-lane) or two-tube (four lanes) structure is chosen. The new suburb will involve at least fifteen 20-story buildings in its business section. These buildings will be built by the developers at a cost of perhaps $50 million, and the residential area will be zoned and laid out to provide for modern and expensive development. Zoning restrictions on the residential area are to be drawn up to insure that the development will be the most modern and luxurious in Cuba.

Contract for the tunnel work has been negotiated by the developers, Compania de Fomento del Tunel de la Habana, S. A., with Raymond Concrete Pile Co., New York. Tunnel design, cost estimates and financing recommendations will be made by Palmer and Baker, consulting engineers of New Orleans, La. Coverdale and Colpitts, New York, will make traffic surveys and toll charge recommendations. The overall plan is an outgrowth of a tunnel study made in 1949 by Knappen-Tippetts-Abbett-McCarthy, consulting engineers of New York. Skidmore, Owings and Merrill, architects, New York, have been selected as consultants for the business and residential suburb and will work in conjunction with Dioniso Suarez and Honorato Colete, Cuban architects.

The tunnel will be approximately 2000 ft long and will provide access to beaches and the Central Highway at Cotorro in less than 15 minutes. Neither the tunnel nor the suburb will cost the Cuban government any money: the development is to be built with private capital from the sale of bonds, and the tunnel itself will pass into government hands in 30 years, with 40% of the profits derived from its operation to go to the government over this period.

The developers believe that government property adjacent to the development will increase in value by more than $60 million. Total investment in the dual project is estimated at $225 million over the next ten years.

(Continued on page 278)



LINE YOUR TRUCK BEDS WITH AMSCO MANGANESE STEEL PLATE

Absorb greater shock, double service life

Amsco manganese steel plate is especially well suited to the job of "half-soling" truck beds. It resists tremendous shock. It turns a tough hide to the clawing action of abrasive materials. Its nonmagnetic properties make it ideal for moving in under the electromagnet.

For example, the company, whose truck is pictured above, lines each of their new truck beds before putting them into service. Under the severe test of a 3½-minute loading cycle, they have found that truck-bed life is extended from *two* to *five* full seasons.

Amsco manganese steel plate is also recommended because it is easy to weld, easy to cut with an oxyacetylene torch.

Whether you half-sole your truck beds new or wait until they are worn thin, it will pay you to consider Amsco manganese steel plate. For additional information, write Amsco Division, Chicago Heights, Ill.

Other applications for Amsco hot-rolled plate

CHUTE LINERS • SIDE SHEETS • DRAGLINES • PATCHING POWER DIPPERS
DREDGE BUCKETS • SCRAPERS • STEEL MILL EQUIPMENT • CRUSHER LINERS
CONVEYOR BUCKETS • PEDESTAL LINERS • JOURNAL BOX LINERS • MUCKERS

AMERICAN **Brake Shoe** COMPANY

AMERICAN MANGANESE STEEL DIVISION

Chicago Heights, Ill.

For the LOW BID on any job, figure your costs with BARCO

BARCO Gasoline RAMMER

SOIL COMPACTION is here to stay! *Specified Compaction* is now accepted practice on all modern construction projects. The BARCO RAMMER gives you specified compaction on these jobs at very little extra cost. Time after time, it has been proven that no other type of equipment can match BARCO PERFORMANCE:

- Better work! Easy to meet specifications calling for 95% to 97.5% (modified Proctor) compaction.
- Ideal for work in restricted areas: inside buildings, close to walls, culverts, and abutments — in trenches, ditches.
- Faster compaction! 20 to 30 cu. yds. per hour — day in and day out.
- One man operation! Completely self contained; no auxiliaries needed.
- Low operating cost. Low initial cost.
- SAFE! Simple to operate. Operators like Barco Rammers.

ASK FOR A DEMONSTRATION — See for yourself — ask for our nearest distributor to give you a demonstration.

BARCO MFG. CO.
514L Hough Street
Barrington, Illinois

Ask for Catalog 621

German highways

West Germany plans big autobahn expansion

For the first time since the war, the West German government is budgeting money for an expansion of the Hitler-built autobahn system. These superhighways, totaling 1,350 miles, were badly damaged, and efforts and money up to now have been concentrated on reconstructing destroyed bridges and repairing pavements. Now, however, a new finance law accepted by the government at the first reading includes funds for new construction, and a total of 370 miles will be built within the next eight years, provided the law passes again at the second reading next January.

Compared with the 5,000-mi system planned by Hitler in the West German area (8,800 miles in the whole of prewar Germany) the new expansion is not very great. Nevertheless, still further expansions have been mapped in the first and second priority additions, so that they will be ready should additional funds be available.

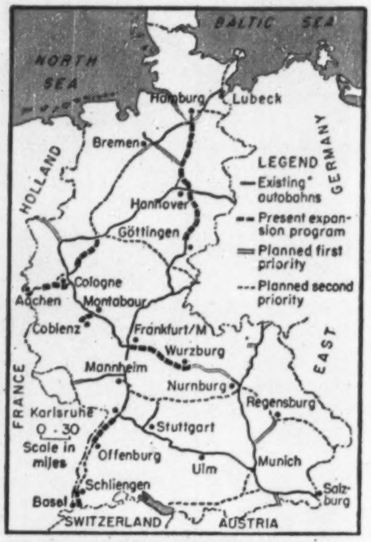
The present expansion program lists eight projects, all to be started at the same time, which will complete the autobahn net existing up to now and which will follow the original plans outlined about 20 years ago:

1. Cologne-Kamen	38 miles
2. Hamburg-Hannover-Gottingen	142 miles
3. Frankfurt-Wurzburg	75 miles
4. Karlsruhe-Offenburg	42 miles
5. Schliengen-Basel	17 miles
6. Cologne-Aachen	38 miles
7. Montabaur-Coblenz	13 miles

The eighth project located between Stuttgart and Ulm consists of a second lane for the existing highway on a distance of 5 miles where the two lanes run separately around the mountains.

Due to the shift of traffic from an east-west to a north-south direction, caused by the division of Germany, the connection between Hamburg and Gottingen and the extension of the Frankfurt-Karlsruhe autobahn south to Offenburg plus the Schliengen-Basel section will be of special importance.

The cost of the expansion program will be about $280 million. For the next 14 years the federal government will contribute $20 million per year, and a financing company will be founded which will administer the sums granted by the government and in addition be entitled to raise a loan of $100 million for the purpose of intermediate financing.



NEW AUTOBAHN PROGRAM, shown by hatched lines, will add 370 miles to present 1,350 mile system.

It is expected that the German states will be willing to loan these $100 million. This way, $30 to $35 million would be available per year for autobahn expansion, which means that construction work could be finished within eight years, while during

(*Continued on page 280*)

NEW SUSPENSION BRIDGE over the Rhine River at Cologne is important link in autobahn system.

DARTO 1903-1954 . . . Fifty-one years of Progress . . . Engineering and Building off-highway trucks . . .

10 ton to 75 ton capacity . . .

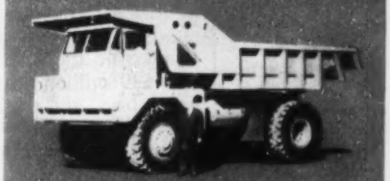
MODEL 10-S — 10 ton end dump truck, powered by 156 H.P. Diesel Engine. 13,000# front axle with 17¼" x 3" air brakes. 26,000# full floating double reduction rear axle with 16½" x 7" air brakes. 12.00 x 20, 16 ply rock lug tires all around. Hydraulic steering. Approximate weight with body and hoist, 19,000#.

MODEL 18-S-UG-S—18 ton underground truck powered by 200-300 H.P. Diesel Engine with torque converter and fully reversible transmission. Hydraulic motor operates steel apron conveyor. Equipped with exhaust scrubber. Hydraulic steering. Operates as shuttle car. Height, 60"; width, 10'8"; length, 28'. Approximate weight, 39,100#.

MODEL 20-S — 20 ton end dump truck powered by 225-275 H.P. Diesel Engine 20,000# front axle with 17¼ x 4" air brakes and 60,000# full floating planetary rear axle with 20 x 9" air brakes. 14.00 x 24, 20 ply rock lug tires front, 16.00 x 25, 24 ply rear Hydraulic steering. 5 speed transmission or torque converter with 4 speed transmission. Approximate weight with body and hoist, 34,700#.

MODEL 30-S — 30 ton end dump truck, powered by 300 H.P. Diesel Engine. D-75D rear axle, 85,000# capacity. FU900 front axle, 25,000# capacity. 20 x 9" air brakes. Torque converters optional. Hydraulic steering. 16.00 x 25 front tires, 18.00 x 25, 32 ply rear tires. Approximate weight, 48,000# with body and hoist.

MODEL 35-SA — 35 ton end dump truck powered by a 300 H.P. Diesel Engine. 85,000# front axle suspended with a hydraulic strut. 85,000# triple reduction, full floating, full planetary rear axle. 20 x 9" air brakes. Steering by hydraulic power on a center bearing cushioned by captive air in a hydraulic air strut. Torque converter with 3 speed transmission. 18.00 x 25, 32 ply tires all around. Approximate weight with body and hoist, 52,000#.



MODEL 35-T — 35 ton side or end dump truck, powered by 300-400 H.P. Diesel Engine, 25,000# front axle with 16.00 x 25 tires all around. 120,000# tandem full floating rear axle. Torque converters optional. Hydraulic steering. Approximate weight, 60,000# with body and hoist.

MODEL 50-S-BDT — 60 cubic yard bottom dump coal hauler. 300 H.P. Diesel Engine, Allison converter and 3 speed transmission, or optional Twin Disc converter and 4 speed transmission. Trailer axle, 85,000# capacity, 20 x 9" air brakes, hydraulic dump. Approximate weight, 68,000#.

MODEL 75-TA — 75 ton end dump truck, powered by two 300 H.P. Diesel Engines. 170,000# capacity, triple reduction, full floating, full planetary drive, tandem rear axle. 20 x 9" air brakes. 85,000# capacity front axle. Steering by hydraulic power on a center bearing cushioned by captive air in a hydraulic air strut. Two heavy-duty torque converters with reversing transmission. Twelve 18.00 x 25, 32 ply tires. Approximate weight, 98,000#.

DART TONNAGE ENGINEERED TRUCKS

CABLE "DARTRUCO" Kansas City 8, Missouri

SUBSIDIARY OF THE CARLISLE CORPORATION

Dependability

GET UP TO

200

RE-USES

With

PLYGLAZE®

CONCRETE FORM PANELS

PLYGLAZE gives you the strength and toughness of Exterior plywood—plus the *extra* stamina, *extra* durability of flint-hard, glass-smooth fused resin fiber surfaces. These tough, virtually indestructible surfaces coupled with plywood's rugged strength, mean maximum re-use—80, 150 or even up to 200. As a matter of fact, *over* 200 re-uses have been recorded. Specify Plyglaze on your next job. Treat it with care, plan and build forms for long service and you, too, can get uses up in the hundreds.

Plyglaze comes in 4′ x 8′ panels; ½″, ⅝″, and ¾″ thick. For complete data, write St. Paul & Tacoma Lumber Co., Tacoma 2, Wash.

ANOTHER MEMBER OF THE FAMOUS TREE LIFE FAMILY OF FOREST PRODUCTS

the following years the $20 million per year coming in from the federal government could be used to pay back the loans granted by the states.

All new autobahns will be constructed to conform with the existing ones—two 25-ft lanes plus 2.5 ft paved edge strips on both sides. A 10 to 16 ft grass strip with shrubs divides the lanes, while outside shoulders 11 ft wide are partly surfaced and partly grass. The bulk of the paving will be concrete, but asphalt will be used where it is considered desirable to eliminate cross joints.

Cross-Cuba Canal

Waterway proposed to give direct line from Florida to Panama Canal

A $400-million cross-country canal that would be of prime importance not only in Western Hemispheric defense but also in commercial development of inland Cuba is under consideration by the Cuban Government.

The plan is an official government project for private capital. It has been approved by the Advisory Council, the Council of Ministers and President Batista.

Larger in size and scope than the Panama Canal, the $400-million project would offer an enormous increase in income to Cuba in providing facilities for the bulk shipment of sugar. Planters on the island could expect to save $40 million yearly now spent on sugar bags and handling.

The cross-country canal, as now conceived, would cut the island by a north-south waterway leading from Cardenas Bay to Cochinas Bay, at the point where Florida is nearest to Cuba. Navy and Merchant Marine ships of the Americas would be able to short-cut trips from Florida and the U. S. east coast to the Panama Canal by about 500 miles.

According to specifications the canal would be 50 miles long with a minimum width of 132 ft and a depth of 50 ft. It would be a one-level waterway as opposed to the Panama Canal which has locks. From the size of the canal it is obvious that it would accommodate battleships, aircraft carriers and commercial shipping.

• **Industrial build-up**—Three ports, one each on Cardenas and Cochinas Bay and one in the middle of the canal would provide entry and exit for for-

(*Continued on page 283*)

J&L Junior Beams prove economical, adaptable

see our catalog in SWEET'S

at Orgill Brothers $2,000,000 warehouse

Five hundred and fifty tons of J&L Junior Beam roof purlins have been specified for Orgill Brothers new $2,000,000 wholesale hardware warehouse in Memphis, Tenn. Both architect and contractor agree that Junior Beams enabled them to save money on this 14-acre project and complete the job on schedule.

Architects W. C. Jones and W. C. Jones, Jr., chose Junior Beams because their physical characteristics permitted greater economy in design, allowed more head room, better clearance and thus provided a better stabilized building. In addition Junior Beam's light weight made for fast, easy handling during construction, as well as during hauling to the building site.

Clinton J. Wagner, Vice President of S&W Construction Company, contractors on the job, reported that "we found Junior Beams to be adaptable and economical for this type of construction. Deliveries were satisfactory and well ahead of schedule. This was a great factor in enabling us to complete the project on time."

Additional savings were outlined by B. S. Merrill, structural engineer for the architects. He said, "we had 6500 sprinklers to install and the use of Junior Beams effected considerable savings . . . I would estimate we would have had to put in 10 to 20 percent more heads if we had used some other joist and at $20.00 a head you can see what we saved."

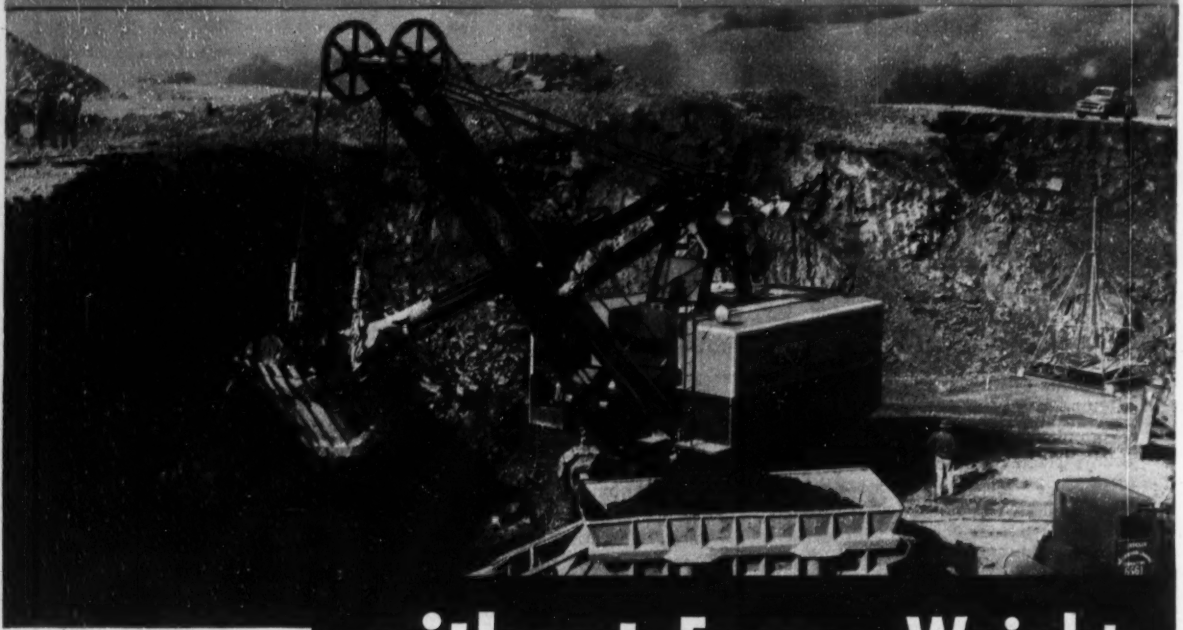
Take a tip from the men who built Orgill Brothers Warehouse, Junior Beams are adaptable, rigid, shrinkproof, fire resistant, vermin-proof, and impervious to termites. Write for more information today. Our new booklet, *J&L Junior Beams*, shows how these modern structurals are being used as floor joists and roof purlins, with loading and spacing tables for various spans.

J&L STEEL

Jones & Laughlin

STEEL CORPORATION — *Pittsburgh*

an EXTRA MARGIN of Strength



without Excess Weight

The unique two-section boom used on Bucyrus-Erie $4\frac{1}{2}$- to 8-cu. yd. Ward Leonard electric shovels solves one of the problems of front-end construction on heavy-duty excavators in a sound, practical way. It provides the strength needed to withstand the shock loads of digging, yet is remarkably light in weight to help keep swing inertia low.

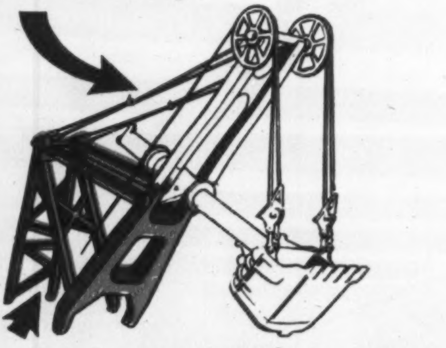
The two-section boom is only one example of *that extra margin* built into Bucyrus-Erie heavy-duty excavators—an extra margin in design *that pays off in extra loads and more output*. There's much more to the story—the tubular dipper handle, the independent rope crowd, the twin dual hoist ropes, the deck location of crowd machinery, the improved dipper design. Write for complete information on the model of your choice—the 4½-yd. 110-B, the 6-yd. 150-B, and the 8-yd. 190-B.

20L54C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Upper boom section, bridge-strand connected to the A-frame, is relatively lighter in construction, because it has to carry only the loads resulting from the pull of the hoist ropes and from the acceleration and deceleration of the swing.



Sturdy lower section, securely attached to the A-frame by pin-connected struts to form an integral part of the machine, has ample strength to take the stresses and shock loads of the digging cycle. Widespread boom feet provide a brace effect to take swing loads . . . no cable suspension or sway braces are required.

eign and home produce. Planned shipyards, warehouses, a highway and a railway paralleling the canal, and freight handling facilities should incite a great deal of industrial development.

It is also expected that agricultural development will result from the canal construction. If the project is built, it is planned to subdivide the swamp territories surrounding the adjacent Zapata peninsula and run them as cooperative farming projects, to be paid for in installments. Cochinas Bay, which is of no commercial importance now, would then become vitally important to Caribbean trade.

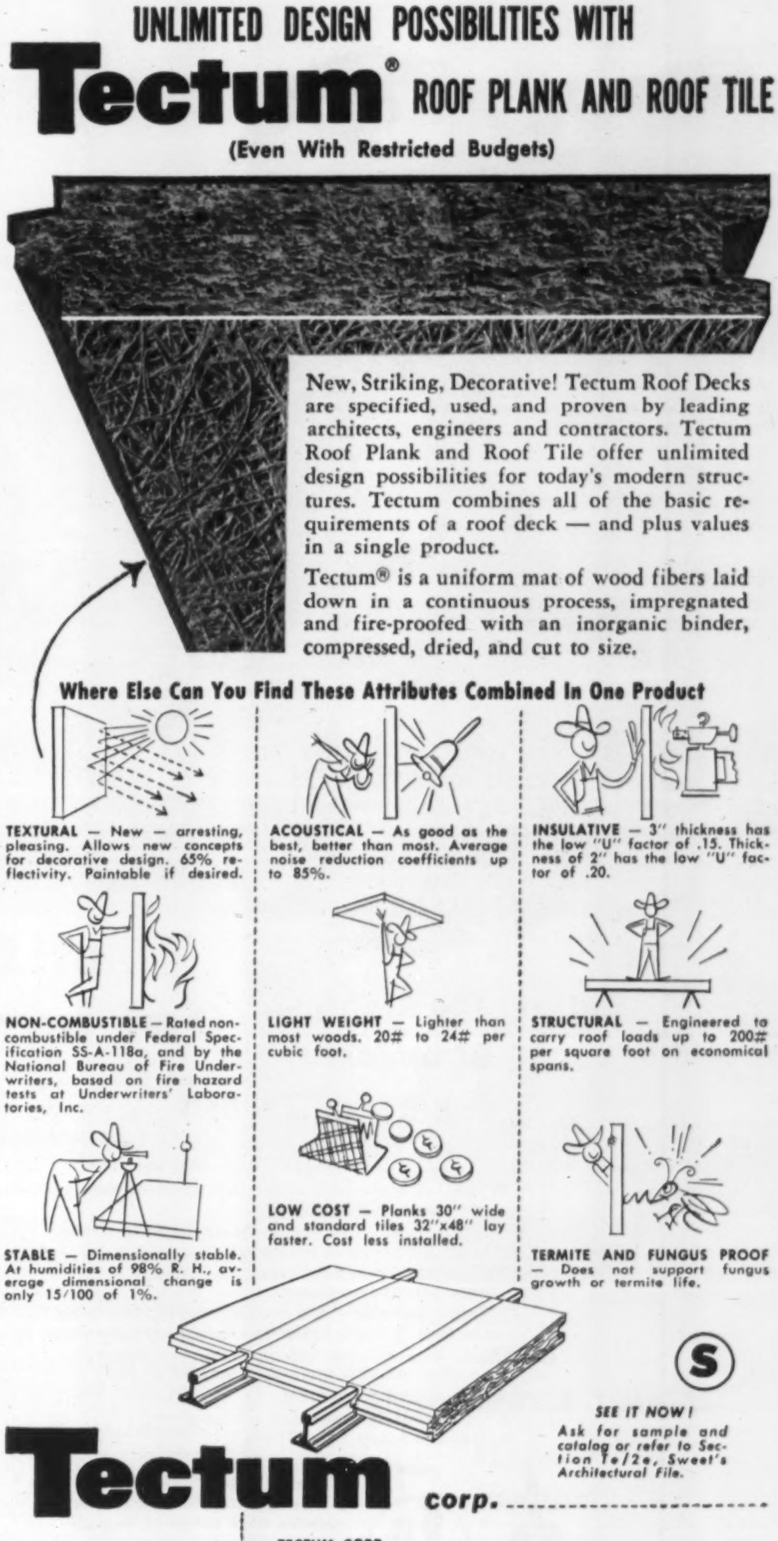
Construction of the canal would provide half a million Cubans with steady jobs for four years. All employees of the canal would be included in the naval reserve not only to avoid jeopardizing security on the defense project, but also to eliminate the possibility of strikes.

• To move fast—To accelerate the proposed project, the government would place areas required under eminent domain. However, in spite of the government's primary role in the work a private company would be picked for the actual construction. Bids for construction would be reviewed by a board made up of Navy staff members and the Commission for National Development. Winning bidder would be exempted from all kinds of federal, provincial and municipal taxes, as well as for all public services it might offer, including sub-concessions. The contractor would be authorized to charge tolls for crossing the canal by boat. Building materials would be imported duty-free, as would all machinery and equipment necessary for the project and its maintenance.

In connection with the overall project, one of the concessions envisaged would be a permanent and autonomous national bank to expedite the exchange of currencies in all purchasing transactions. The bank would act as a commercial credit establishment to create new reserves and jobs. Another projected bank would be the Bank of the Poor aimed at encouraging development of small commercial, industrial and agricultural enterprises through long-term loans.

A major item in the project would be the operation of a passenger and cargo ferry line operating between Cuba and the ports of New Orleans, Florida, Central America, Colombia and Venezuela. Hotels, casinos, seashore resorts, theaters, sports grounds, swimming pools, and hunting and

(*Continued on page 284*)



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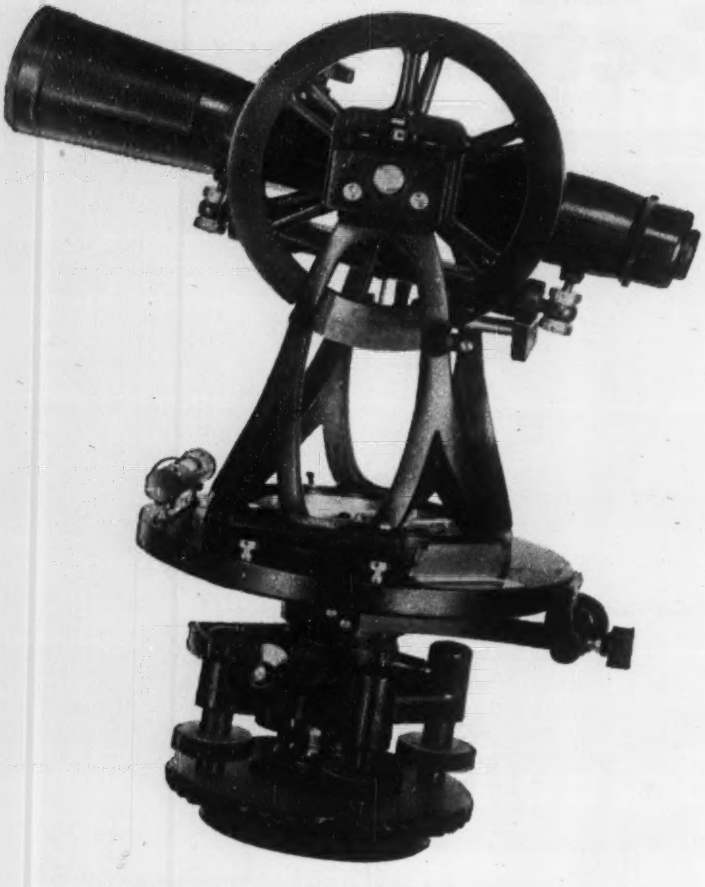

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fishing preserves would also figure in the concessions for development.

According to preliminary government plans, the cross-country canal would take four years to complete, as opposed to the 24 years it took to construct the smaller Panama Canal. It is understood that the United States looks with favor on the project: a good omen, since the huge scope of the job would involve both Cuban and foreign investors.

Mexican railroad gets loan for modernization program

The International Bank for Reconstruction and Development has loaned $61 million to the Pacific Railroad of Mexico for rehabilitation and modernization.

The four-year project, based on a survey by the New York consulting engineering firm of Coverdale & Colpitts, includes re-laying almost the entire track and repairing bridges along a 1,200-mi route from Nogales (on the Arizona-Mexican border) to Guadaljara. This northwest coast line serves one of the country's most rapidly growing agricultural regions, where freight tonnage more than doubled between 1936 and 1952.

Total cost of the program is $80 million. The World Bank loan will pay for the import of equipment, including 4,000,000 railroad ties and 170,000 short tons of rail.

Hongkong Airport project faces silt, fill problems

Plans for the new $16.7-million Hongkong Airport reveal some of the engineering problems involved in building the project out into Kowloon Bay.

It is estimated that over 11,000,000 cu yds of fill matter will be needed to form the airport. Then—in order to contain the fill on which the runway will be built—it will be necessary to erect 3¼ miles of sea walls.

In addition, there is a 20-ft blanket of soft silt covering the solid sea bed. Since this silt is unsuitable as a foundation for the promontory, some 2,000,000 cu yds of it will have to be removed from beneath sea walls, runways and taxitracks.

Airport work will be divided into two stages. The first will include demolition of hills, plus construction of the promontory into the bay, the runway, drainage facilities, services. The second will involve construction of the terminal and maintenance areas with associated buildings, aprons, roads and services.

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Photo above—*Amcreco piles being used in construction of the Napoleon Avenue Wharf, New Orleans, La. We have supplied creosoted piles and structural timbers to the Port of New Orleans for many years.*

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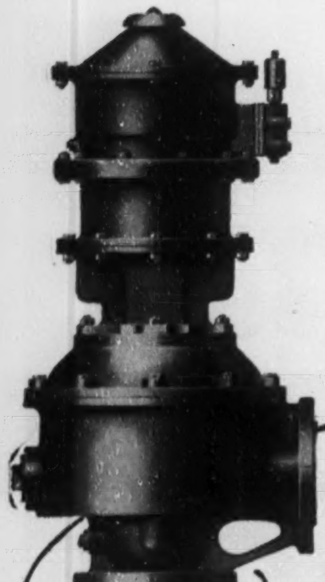

New Simplex Type CCAV Valve. Combination controlled-closing and vacuum-breaking valve.

ONE 4-INCH CONNECTION to your main pipe line...

PREVENTS { **surge rupture** / **vacuum collapse** }

Why take chances? No matter what the safety factor, surge and hammer can play some dirty tricks . . . rupture lines, blow out packing, fracture valves. And if the line breaks or is drained rapidly, it can collapse from vacuum.

Simplex Type CCAV is a new combination! A controlled-closing and vacuum-breaking valve to protect your lines against these dangers. It's easily installed, moderately priced, positive-acting.

When lines are being filled, Type CCAV Valve vents air to prevent binding, controls transfer time to prevent surge damage. Timing can be quickly set from a few seconds up to well over ten minutes—as dictated by site requirements. If hammer is excessive, Type CCAV automatically discharges water . . . extra protection for costly lines and fittings.

When lines are subject to collapse from rapid draining or line breaks, the Simplex CCAV acts quickly . . . breaks the vacuum for maximum safety.

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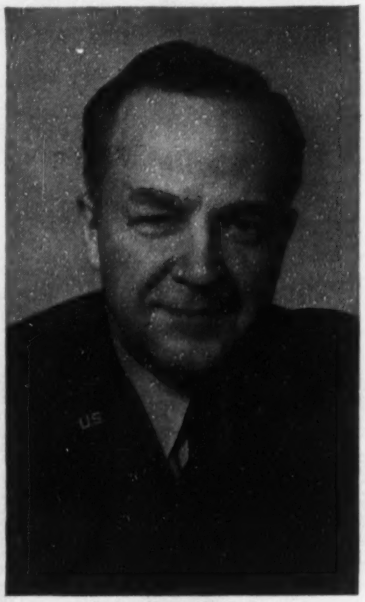
MEN AND JOBS



Col. Albert E. Stoltz

Name engineer officer for Air Academy work

Government sources last week announced the nomination of a senior Corps of Engineers officer, and the formation of a new agency to handle the construction of the proposed Air Force Academy near Colorado Springs, Colo.

The officer named to take charge of work on an installation that has been unofficially estimated to cost $126 million is Col. Albert E. Stoltz, who has been deputy director of the Joint Construction Agency—which handles the multimillion U. S. military construction program in Europe for the Army, Navy and Air Force.

In his new post, Col. Stoltz will be director of the Air Force Academy Construction Agency, now being formed.

Formerly assistant chief of staff for installations at the Air Force European headquarters at Weisbaden, Col. Stoltz served (before his European assignments) with the directorate for installations at Air Force headquarters in Washington. He is a 1932 West Point graduate.

Appoint new engineer for largest N. J. city

George W. Andress, dean of the engineering forces of Newark, N. J., in point of service, has been appointed city engineer for New Jersey's largest municipality.

Mr. Andress succeeds John S. Flockhart, who became city adminis-

(*Continued on page 289*)

The advantages of WROUGHT IRON PIPE for snow melting systems start with installation and continue in service

It isn't unusual at all for designers to divide the advantages of wrought iron pipe for snow melting into *installation* advantages and *service* advantages. We call them the "before-and-after" advantages of wrought iron, but regardless of title, they are mighty essential to that all-important goal—ECONOMY.

Let's take a look at what wrought iron pipe means to economy during installation. It's easily formed and welded, on the job, with standard equipment. No special techniques, no extra tools are needed for a fast, dependable job. Wrought iron pipe bends true, and is free from annoying "spring-back." This feature eliminates strain on connected equipment and speeds work. In welding or threading operations, wrought iron's uniform structure pays off in sound welds; sharp, full-depth threads, all accomplished in minimum time. Essential, too, is wrought iron pipe's strength. Users report that it has what it takes to withstand mechanical damage and doesn't require the "kid-glove" treatment.

Wrought iron pipe's superior "in service" reputation is built around three big points. First, its ability to resist corrosion, serve longer at lower cost per year, is providing satisfactory, economical operation in hundreds of snow melting installations. Second, wrought iron pipe's high rate of heat emission means maximum snow melting efficiency. Third, wrought iron pipe's coefficient of expansion, virtually identical to concrete over wide temperature ranges, bans the danger of thermal cracks, and loss of bond.

There is, of course, more to the wrought iron pipe snow melting story. Our bulletin, *Wrought Iron Pipe for Snow Melting Systems,* gives complete details. Write for your copy.

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George W. Andress

trator under provisions of a new city charter recently (ENR Aug. 26, p. 49).

As city engineer, Andress—a veteran of 40 years of service with the city's engineering organization—will head a department that includes five divisions: Engineering, sanitation, water supply, public property, and motors. A graduate of Cooper Institute of Technology, the new department head joined the city engineer's office in 1914 as a paving inspector, became deputy chief engineer a year ago.

Men and Jobs briefs . . .

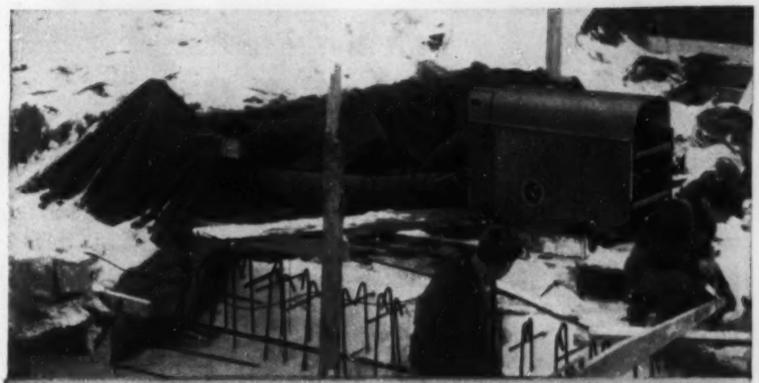
- **Careers—W. C. Henry,** formerly superintendent of sewage treatment for Fairfield, Conn., has been named superintendent of the new $12.5 million Wilmington, Del., sewage treatment plant . . . **W. T. Miller,** formerly of Rochester, N. Y. staff of the New York Water Service Corp., has joined the staff of the Cast Iron Pipe Research Association, Chicago . . .

George C. Wallace, lately with the Honolulu, T. H., department of public works, joins the engineering staff of Metcalfe & Eddy, Boston . . . **Claude West** becomes Highland County (Cincinnati) engineer . . . **L. J. Goodman,** recently on the Lehigh University staff, becomes Associate Professor of Civil Engineering at Syracuse University . . .

Pacifico Montano becomes civil engineer-supervisor of the Latin-American Division of Donald J. Belcher & Associates, Ithaca, N. Y. . . .

W. H. Wood, former Asheville, N. C. city building inspector, becomes executive secretary of the Asheville

(*Continued on page 290*)



This newly-poured concrete foundation at the Kurth Malting Works, Minneapolis, Minnesota, was protected while it was setting by a Herman Nelson Portable Heater.

Why does Herman Nelson outsell all other portable air heaters?

Because: indoors or outdoors, Herman Nelson Portable Air Heaters are best for any job.

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Maximum efficiency outdoors . . . with flexible canvas ducts channeling heat right to the spot where you need it!

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Here's what masonry contractors who have used Util-A-Lift and Model 40 report: 50 to 60 per cent of the usual general labor force released . . . need for elevator eliminated on many jobs . . . need for loading strip and double-width scaffold eliminated.

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MEN AND JOBS

Housing Authority . . . **W. E. Thompson** moves up from city manager of Richmond, Calif., to city manager of Oakland . . . **Col. Otto J. Rhode** becomes district engineer at St. Paul . . . **L. R. LaPorte,** formerly a U. S. Navy public works officer and an engineer with the New York City Housing Authority, becomes general manager of construction and building operations for the Columbia Broadcasting System . . .

Russell C. Weber is a new partner in the firm of LeRoy Crandall & Associates, Los Angeles foundation engineers . . . **T. W. Forbes,** for the past three years technical director of the committee on highway safety research for the National Research Council, joins the staff of the American Institute for Research in Pittsburgh, to participate in safety studies for the Pennsylvania Turnpike Commission.

• **Retirements–Walter J. O'Brien,** for 19 years superintendent of highways and engineer for Oneida County, N. Y. . . . **James D. Bell,** after 40 years of service with the Colorado highway department . . . **Nicolas N. Smeloff,** system planning engineer for Pennsylvania Power & Light, after 33 years of engineering service with PP&L . . .

Claud Davolt, who joined the engineering staff in 1925 and became Cowlitz County, Wash., engineer . . . Five men with long service with Wisconsin's state highway commission, retiring this year: **Thomas M. Reynolds** of LaCrosse; **William F. Baumgartner** at Eau Claire; **Garth I. Germond** at Superior; **Stephen A. Koszarek** at Rhinelander . . .

Anthony F. Schlicter, after 23 years with the Corps of Engineers . . . **Leo Raywid** after 27 years of U. S. government service, last as a structural designer for the Bureau of Yards and Docks.

• **Associations–J. R. Malone,** of Durham, N. C.'s water department, becomes president of the state section of AWWA . . . **Frank Callahan** elected secretary-manager, Northern California chapter, AGC.

• **Honors–Col. L. H. Hewitt** (CE Ret.) has been named U. S. commissioner on the International Boundary and Water Commission, U. S. and Mexico . . . **P. J. Reidy,** president, Purdy & Henderson Associates, becomes chairman of the engineers committee of the Travelers Aid Society of New York . . . **H. C. Turner, Jr.,** president of Turner Construction Co., is chairman of the building division for the National Fund for Medical Education.

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means:

faster, easier, safer, quieter structural erection

...and greater strength

▲ **THE KILROY STRUCTURAL STEEL COMPANY** speeded structural erection and cut costs on their Terminal Building tower job at the Cleveland Airport with high-strength bolts from U.S. Steel Supply.

◀ **HERE A ONE-MAN "TEAM"** installs high-strength bolts.

- Faster because there is only one simple process involved – no disassembly of fitting-up bolts is required.
- Easier because a two-man team can do the job quickly with just a pneumatic wrench and a hand wrench. (Actually *one* man can do it.)
- Safer because no heat is required. Men handle the bolts faster, with more confidence. Also, there is no body-jolting recoil from the power wrench.
- Quieter because no pneumatic hammer is used. This is particularly important in hospital zones, school zones, or any area where noise is objectionable.
- Greater strength because high-strength bolts are stronger themselves than rivets and they form stronger joints. The two hardened washers that are used prevent imbedding into the structural steel and so the high clamping load is uniformly maintained. Less maintenance and inspection is required with high-strength bolts. And they will last as long as the structure without trouble. Yet, if necessary, unbolting is not difficult.

With *all* these advantages, worthwhile savings usually result with high-strength bolting despite their higher initial cost. The biggest savings factor is the greatly increased speed of erection.

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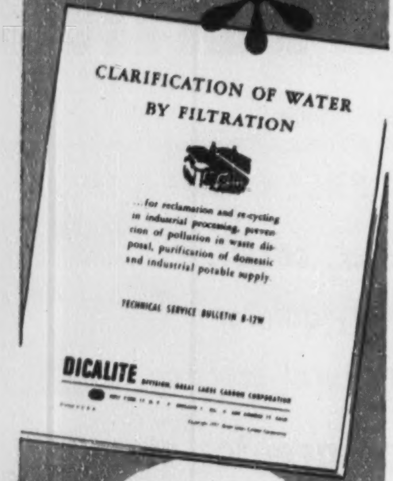

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This FREE Bulletin gives valuable data on water filtration...

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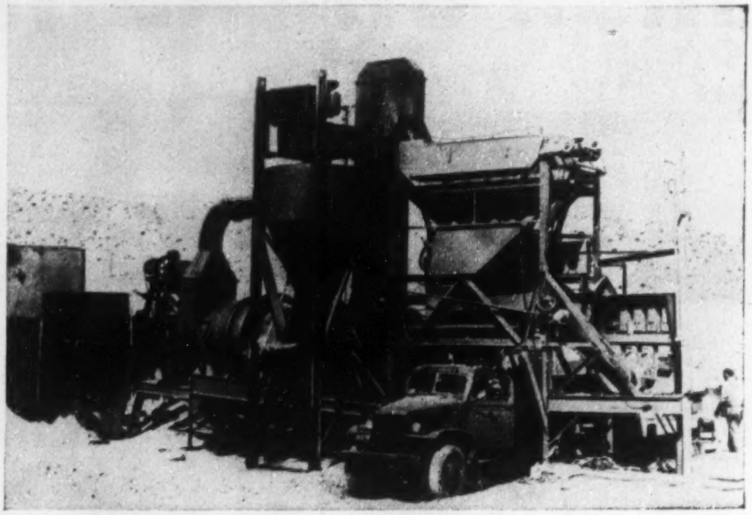
NEW PRODUCTS

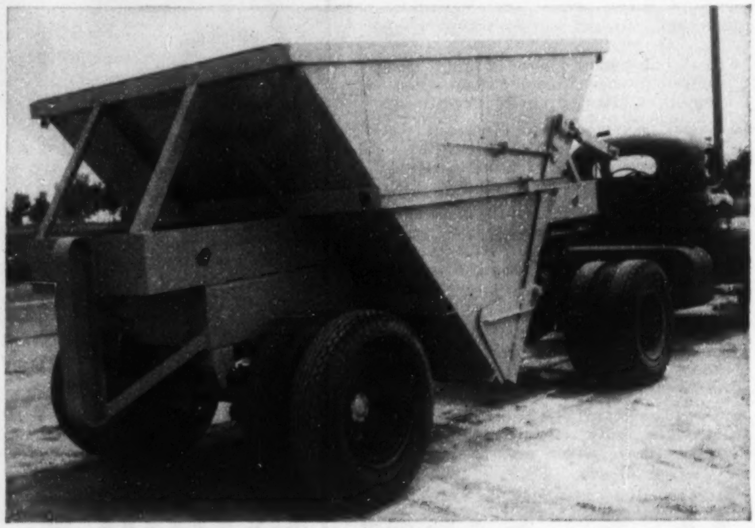


New batch plant is highly portable

The Model TM portable asphalt plant is a complete batch-type unit designed for use in areas where larger plants cannot be erected and operated profitably, and where portability is an important factor.

The manufacturer claims that the welded steel framework is heavily braced to withstand torsion and stress in transit, and all undue vibration is eliminated. The entire unit is mounted on heavy-duty pneumatic truck tires.

Tractor type trailer hitch and air



Trailer spreads 8 ft wide, 10 in. deep

A new bottom-dump hauling and spreading trailer has been designed to double the speed of spreading operations at a decrease in cost. The spreader-trailer is called the Timpte Gilpatrick and has a hauling capacity of 10 yds struck, 13 yds heaped. Dumping is controlled by an air valve located in the truck cab and a 1 to 10-in. layer of material can be spread while the equipment is "on the run". The trailer weighs 7,300 lb and a 3-ton or larger truck tractor is recommended. Tires are standard 10:00 x 20. Timpte Bros., Inc., 40th & York, Denver 5, Colo.

connections permit the unit to be moved with a semi-type truck tractor, and the chassis and running gear are designed to provide maximum strength with minimum maintenance.

Ease of erection is one of the big features of the Model TM; equipped with its own exclusive self-erecting device, the entire, cage, consisting of vibrating screen, mixing unit, aggregate weigh hopper and asphalt bucket, is reportedly raised into position merely by pushing a button. The power-hoist is run by a ½ hp worm gear motor. Total time for the operation is a maximum of 30 min.

Hot and cold elevators are in operating position on the trailer. The hot elevator, a vertical chain and bucket type, is hinged for erection by means of a block and tackle. The cold elevator is telescoped for traveling and is lowered into position from the trailer. It can be completely removed if a shorter trailer length is desired.

The Desert Rock Company, Indio, Calif., reports that a two-man crew, working without a tractor, erected the main sections of their portable plant in two hours. It is estimated that under normal working conditions, the complete plant, including all the accessories, can be erected in less than one day.

The asphalt plant has been designed to assure accurate graduation control. A Symons horizontal type screen controls gradation for four separations; screen enclosure eliminates all dust nuisance at this point.

The Model TM has a welded steel aggregate weigh hopper and asphalt bucket suspended on hopper-type scales and levers. The mixer, a welded steel, one-piece body with removable cast alloy liners, is identical with those found on the larger plants made by the manufacturer. A feature of the mixer is that the liners may be replaced without removing the jacket.

A multi-compartment storage bin is made of heavy gauge steel with four sections with overflow and tailing spouts. An overflow bin with manually operated discharge gates is part of the storage bin.

The dryer capacity is said to permit high asphalt production, even where aggregates have an extremely high moisture content. The previously mentioned Desert Rock Co. reports that in spite of the high moisture content of the aggregate at one of their locations, the Model TM turned out as much as 55 tons per hour. Normally, the 5-ft dryer will average 40

(Continued on page 294)

How a Sherman Power Digger Does More Work in Less Time with No Standby Equipment

Nearly every department in the city of Hopkins, Minnesota, finds a use for this versatile Sherman Power Digger.

The Water Department uses the machine when cutting off discontinued service lines at the main. They dig a hole in the street (usually blacktop) 3′ wide by 6′ long by 8′ deep. The hole must be plumbwalled for minimum replacement of paving. This operation used to tie up a truck all day, an air compressor half a day, and two men with hand tools, a full day.

Using a Sherman Power Digger, they now do *three* such jobs in one day, with only one man on the digger, no truck, and no compressor, except for concrete pavement. The job goes faster because they can dig the hole, shut off the line, and backfill before the walls begin to cave. Local soil conditions formerly required cribbing many of these excavations.

If *your* work involves the construction or maintenance of underground facilities, you will profit with a Sherman Power Digger. It's compact, fast, and flexible, with low initial cost and amazing economy of operation. Write today for full details, without obligation. Ask for Bulletin No. C57R.

Designed, Engineered and Manufactured Jointly by
SHERMAN PRODUCTS, Inc.
Royal Oak, Michigan
WAIN-ROY CORPORATION
Hubbardston, Mass.

Patent No. 2,303,852
Other patents pending

© SHERMAN PRODUCTS INC., 1954

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN

To help you hole-thru faster...

COMMERCIAL liner plates speed up mining in soft ground tunneling

Working many feet underground in the heading of a soft ground tunnel, this crew is unconcerned about the possible danger which could result from a cave-in. By installing the COMMERCIAL steel liner plate system of ground support, the contractor of this job is providing the best safety insurance for his men as well as assurance for himself that his job can be completed on schedule.

When you realize that the COMMERCIAL plates have continuous inward flanges with all four corners solid, it is easy to understand why they are so strong and will support such heavy loads. No one wants to take a chance of loosing a heading because of inadequate ground support. A lost heading, like a lost week-end, costs money and takes time to recover from.

Look how close to pay line these "sand hogs" mine. Just a few more spadefuls of dirt need to be removed before one of them will slap the next plate into place while the other will slip seven bolts thru matching holes in the flanges and quickly tighten up the nuts with a rachet. Bolt in one hand, nut in the other, two inside vertical flanges between with matching holes—everything out in the open—what could be quicker or more simple?

As all flange joints are butt to butt and plates are curved to the exact required radius, there's no over-mining beyond pay line to cause voids behind the plates. Thus ground ravelling is minimized and reduction of the amount of grouting behind the steel lining, if any, becomes a very substantial cost-saving item.

Our experience, from many years work with engineers and contractors who have successfully used the COMMERCIAL liner plate system in hundreds of different soft ground tunnels, can be a great help to give you the footage and safety needed to complete your tunnel on schedule. There will be no obligation.

"COMMERCIAL"
PRODUCTS PREFERRED BY CUSTOMER ACCEPTANCE

THE COMMERCIAL SHEARING AND STAMPING COMPANY
Youngstown, Ohio · Chicago, Illinois · Salt Lake City, Utah

LA-12

to 50 tons of aggregate per hour. It may be operated with gasoline, electric or diesel power unit.

All controls on the new Model TM Portable Asphalt Plant are located on the operating deck. In most cases, this enables one man to run the entire plant from a central location.

To assure complete portability of the new model, all accessories are skid mounted for truck loading. They also are available with tractor type trailer hitch and air connections, and can be transported by a semi-type truck tractor. STANDARD STEEL CORP., 5001 BOYLE AVE., LOS ANGELES 58, CALIF.

Aluminum flush panel door is lightweight but strong

A new aluminum flush panel door features a sandwich construction of an impregnated, moisture-resistant honeycomb core and hardboard reinforcing of the aluminum for added strength. This method of construction is said to have proved its ability to absorb hard wear in exhaustive laboratory testing; slamming and racking tests failed to damage the new model even after a million test cycles.

Weather-resistant qualities of the new flush panel door, including an improved moisture seal, make it suitable for use as an exterior entrance as well as in interior installations; anodizing of the aluminum gives a finish that requires little maintenance. Framed by extruded tubular frame sections, the door is available in either butt hung or offset pivot models.

In addition to the basic design featuring the solid panel, numerous models with glassed and louvered openings provide variations of design.

(Continued on page 296)

NEW CHEVROLET TRUCKS

have what it takes to boost efficiency and bring down costs!

In the next three paragraphs you'll find a few good reasons why you can get more work out of a Chevrolet truck and save money doing it.

INCREASED POWER IS THE FIRST BIG REASON

With Chevrolet's higher compression ratio you've got more power under the hood. Power that results in greater acceleration and hill-climbing ability. Faster starts and acceleration over the day's work save valuable time and increase over-all efficiency. Check the gas mileage, too. With this higher compression ratio, your Chevrolet truck registers *more miles on the job* for each tankful of gas. That's where you start to save money.

BUILT-IN RUGGEDNESS SAVES EVEN MORE

The strength and stamina of more rigid frames, and the special chassis features that pertain to each model—these combine to add extra ruggedness to your Chevrolet truck. Push it hard on the rough jobs; keep it going over long schedules—you'll still find your upkeep costs lower and your Chevrolet trucks lasting a lot longer.

ONE LAST POINT—and maybe the most important to you—you'll find Chevrolet's line of trucks priced the lowest of all! Talk over your needs with your Chevrolet dealer. He'll be glad to give you the facts about the best model for your job. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

MOST TRUSTWORTHY TRUCKS ON ANY JOB! **CHEVROLET**

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates back-rubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cabs of 1½- and 2-ton models, standard cabs only in other models. "Jobmaster 261" engine available on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*

digging

The Biggest Gas Line Ever Built

IN THE MOJAVE DESERT east of Barstow, California this Cleveland "320" Trencher is making the final cut, 4-ft. wide, 7½-ft. deep, for Pacific Gas and Electric Company's 34" "Super Inch" pipeline—reportedly the largest gas transmission line ever built.

On nearly every major pipeline construction project throughout the world you'll find Cleveland trenchers setting the pace. And on the majority of smaller trunk lines, gathering lines, lease lines, etc. you'll find Clevelands leading the way too. Pipeliners, large and small, will tell you Clevelands are "*Good* . . . Everywhere" because they dig *more trench—in more places—at less cost.*

There are Cleveland models for every size and kind of pipeline trenching and backfilling. Get the latest "dope" on them now—from your local distributor or by writing to:

THE CLEVELAND TRENCHER COMPANY
20100 ST. CLAIR AVENUE • CLEVELAND 17, OHIO

CLEVELAND

NEW PRODUCTS

All glass will be mounted with a foam-vinyl to provide a cushion against slamming and jarring. Originally styled handles and push plates are in keeping with the contemporary design of the door.

The door is available in sizes ranging from 2 ft x 6 ft 8 in. to 4 ft x 8 ft in the single door and from 5 x 7 ft. to 6 x 7 ft in the double door. Weight averages 3 psf. THE KAWNEER CO., NILES, MICH.

Air motor and special axle makes wagon drill mobile

An air motor and special axle has been added to the Cleveland DR-30 wagon drill to make it self-propelled.

According to the manufacturer, the change provides more flexibility in deep-hole drilling power and saves set-up time. The air motor, with its gear ratio, is said to have plenty of power for propulsion over rough terrain. A similar air motor is also used for raising and lowering the wagon-drill boom to further speed the drilling operation. Power is transmitted from motor to wheels by an enclosed chain drive. Wheels are mounted on an automotive-type axle.

The patented air feed has an 8-foot travel for 6-foot steel changes, and it is claimed that this feed not only makes drilling faster with both steel and carbide bits, but also increases the footage drilled per bit. CLEVELAND ROCK DRILL DIV., LE ROI CO., 12500 BEREA RD., CLEVELAND 11, OHIO.

Imported transit designed for economy, rugged duty

A new, lightweight, imported transit is now available in the U. S. The UMECO Model 100 5-inch Survey Transit weighs only 9 lbs. and is said to be ideal for work in mountainous country and for contractors needing a precision instrument in construction work.

This instrument has a 5-inch diameter horizontal circle and a 4½-inch diameter vertical circle. Both read to 30 minutes and have verniers reading to 1 minute.

The 9-inch telescope has a 23 power magnification and is equipped with stadia lines at a fixed 1:100 ratio. The transit is made in Japan under supervision to American standards. The instrument is tested and adjusted before being shipped from overseas and after arriving in the U. S. Sold under a full money-back guarantee. Price $350.00. UMECO OPTICAL DIV., 465 CALIFORNIA ST., SAN FRANCISCO, CAL.

(*New Products continued on page 298*)

Any Drain-Cleaning Compound can be used SAFELY with

Vitrified CLAY PIPE

You've seen drain-cleaning compounds sizzle and foam as their caustic corrosive chemicals react together. Perhaps you've even seen some types of *non*-clay pipe that were eaten away by these compounds.

But Vitrified Clay Pipe is completely unaffected by these chemicals—in any concentration, and in any quantity. At the N.C.P.M.I. research laboratories in California, production-line samples of Clay Pipe were soaked for weeks in concentrated solutions of 10 different drain-cleaning compounds. Result? Every section of Clay Pipe came through as sound, true, and free from corrosion as the day it was made.

Tests like these have been going on for years. You can be sure you're getting the latest and best when you use Vitrified Clay Pipe.

Vitrified CLAY PIPE

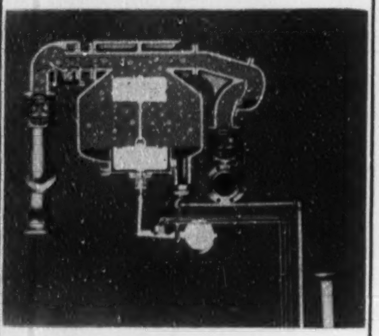
NATIONAL CLAY PIPE MANUFACTURERS, INC.
1520 18th St. N. W., Washington 6, D. C.

311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio
703 Ninth & Hill Bldg., Los Angeles 15, Calif.
100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
206 Connally Bldg., Atlanta 3, Ga.

C-954-2

SEWAGE
BRIEFS
from the Yeomans Guard

NOW!
Effective pre-aeration
of wastes
in the Collecting System



PRESAIRE* aeration mechanism a new device available only with Yeoman Pneumatic Ejectors improves aerobic condition of wastes in the collecting system *before it reaches the treatment plant!*—combines a treatment function with dependable, economical sewage pumping equipment.

Advantages of Yeomans Pneumatic Ejectors equipped with the PRESAIRE device include:

1—Improved aerobic condition of sewage for better ultimate treatment at the plant.

2—Reduced B.O.D. loadings at the treatment plant because of higher oxygen content.

3—Added control and prevention of noxious odors.

4—Prevention of septicity in long and short force mains.

5—A shorter period of treatment at the plant since the wastes delivered are more ameniable to treatment.

6—Elimination of pre-aeration equipment in many cases.

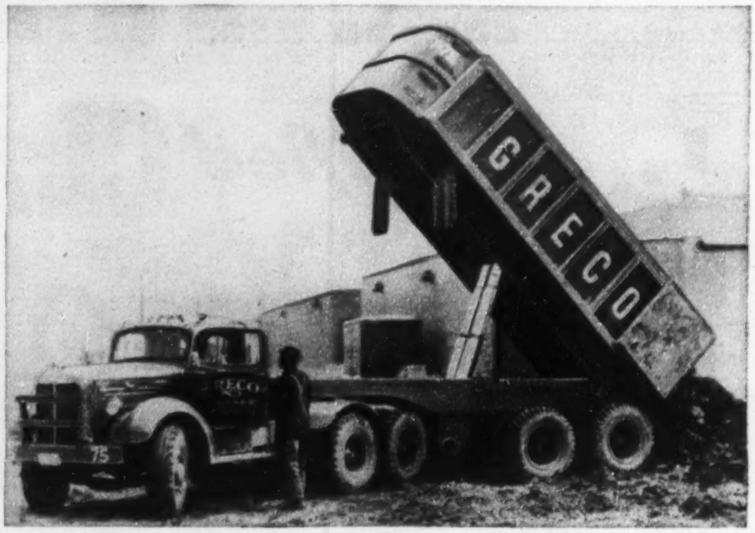
Write today for detailed information.

* *Patents Pending—a Yeoman's trademark*

See Pre-Filed Catalogs for complete line of Yeomans Pumps and Waste Treatment Equipment, or call your local Yeomans representative listed in the Yellow Pages of your telephone book under "Pumps."

YEOMANS BROTHERS COMPANY
1999-1 No. Ruby St., Melrose Park, Ill.
(suburb of Chicago)

YEOMANS

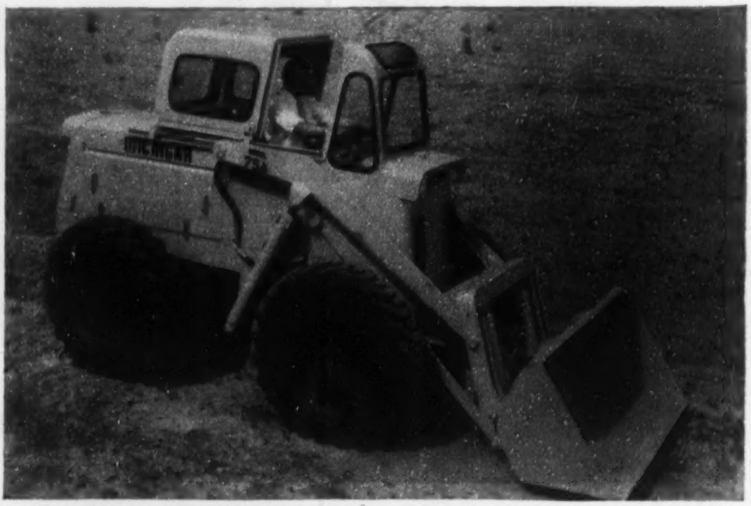


Dumping trailer has 20-yd capacity

A new heavy duty dump trailer has been designed for use in off-the-road excavation work.

Known as model 19TTE Excavator, the trailer unit is designed for use with tandem axle tractors; body capacity is 20 cubic yd with payload rating of 60,000 lb. The trailer has a high capacity reinforced frame and is equipped with heavy duty springs and axles. Equal load distribution, front and rear, provides maximum traction for off-the-road work.

The Excavator body is constructed of either 8 gauge high resistance or 10 gauge high tensile steel. Body



New cabs built for front-end loaders

An all-weather, molded steel cab is now available for all models of Michigan front-end loaders; this is in addition to other styles of cabs previously introduced. Designed for easy field installation, the cab has an all-around and overhead window tinted to eliminate the sun's glare. The movable rear section of the cab will lock closed or in opened positions; quick release mechanism frees the lock when the cab is pulled back to open. The inside of the cab is sprayed with insulating compound to deaden noise. The standard color of the cab is the traditional Michigan yellow. A windshield wiper is standard equipment and a heater and defroster unit is optional. Total weight is 275 lbs. Clark Equip. Co., Benton Harbor, Mich.

features include reinforced top rolls with deflector angles to prevent shovel damage, box type side bracing and a laminated floor consisting of 1-½ in. of oak under a ¼ in. wear plate.

According to the manufacturer, 6 in. rear-to-front body taper, floor corners rounded to a 6 in. radius, barn door-type tail gate and the 45° dumping angle assure clean discharge of sticky materials.

Lifting capacity of 75,000 lb is provided by the twin 8 in. telescopic hoist cylinders. Maximum stability during dumping has been obtained by mounting the hoist cylinders close together, the manufacturer states. The Galion Allsteel Body Co., Galion, Ohio.

Compact charger operates with battery in place

A line of compact automatic chargers for 6-volt storage batteries has been designed to operate without removing the battery from the car or vehicle. The unit is simply plugged into any 110-120 v outlet and the charger clips slipped onto the terminals. An automatic circuit breaker protects the battery and electrical system in case of a short or overload.

In addition, the manufacturer points out that the Electra Chargers provide full ampere output capacity, a full wave selenium rectifier and heavy duty, full capacity transformer. The cases are of heavy gauge fully drawn steel and finished in gray hammertone.

Three models are available in outputs of 10, 6 and 4 amperes. All models carry a manufacturer's guarantee and are listed by Underwriter's Laboratories, Inc. Electra Mfg. Co., 2537 Madison, Kansas City, Mo.

New line of plastic hard hats meet safety "specs"

A new line of fiber-glass safety hats is reported to meet general industrial requirements and federal specifications for electrical resistance, impact and penetration by falling objects, flammability and moisture absorption.

The full-rimmed hat, 14 oz., and the cap (with visor only, 12¼ oz.) are made in grey, white, yellow, green, and brown. A combination safety cap and arc-welding helmet is offered with either fixed or lift-front lens holder. A feature is a headband of extruded plastic with replaceable, cork-lined sweatband, said to hold its shape better and give firmer fit. Straps of webbing form the cradle for the head. Jackson Products, Inc., Warren, Mich.

AMERICAN INDUSTRY CONTINUES TO BUILD WITH LURIA

Omar INCORPORATED
has expanded with
30
LURIA Buildings
since 1949

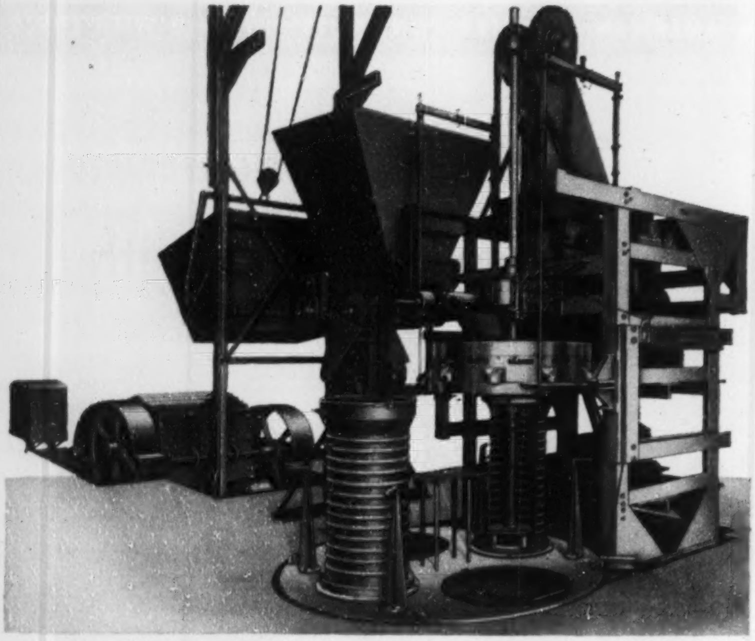
This new Omar building in Indianapolis, Ind. — the 30th Luria structure for America's fastest-growing bakers — basically is a counterpart of its twenty-nine predecessors located in Ohio, Indiana, Nebraska, Iowa, Wisconsin and Illinois. E. W. Hauser Construction Company of Indianapolis was general contractor for this newest building.

LURIA combines the DESIGN and PERMANENCE of CUSTOM-BUILT UNITS... with the SPEED and LOW COST of STANDARDIZATION

Can standardized buildings *look* the way you want them to? Yes—if they are Luria structural steel buildings. The *flexibility* and *adaptability of design* provided by the "Luria system of standardization" make possible almost *any* type of architectural treatment suitable to your *individual* requirements. And to assure you *durability of structure*, Luria materials and construction surpass the most stringent building code requirements. Finally, Luria Buildings deliver substantial *initial* savings, continuing *maintenance* savings. The list of companies who *re-order* Luria Buildings is best testimony of the many advantages of Luria Standardization. Contact your Luria representative. *It pays!*

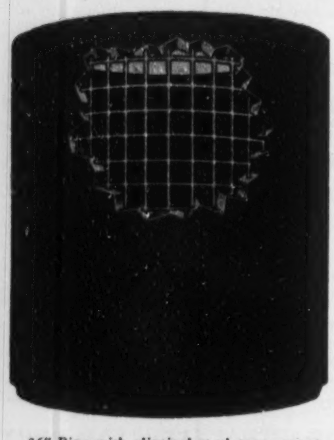
AISC

LURIA ENGINEERING Company
511 FIFTH AVENUE, NEW YORK 17, N. Y.
Plant: BETHLEHEM, PA.
District Offices: ATLANTA • PHILADELPHIA • BOSTON • CHICAGO • WASHINGTON, D. C.



McCracken "T" Concrete Pipe Machine

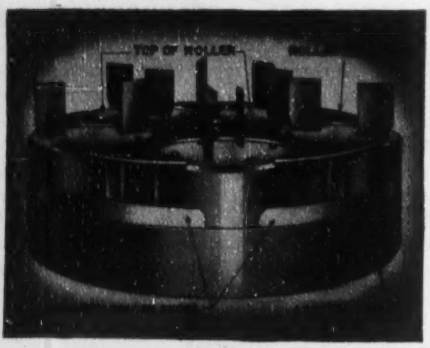
Doubles production of 6" to 36" Pipe



Here's the one Machine on the market today that can handle *all* your production from 6" to 24" Bell and Spigot Sewer Pipe (plain) and from 12" to 36" Tongue and Groove Culvert Pipe (reinforced). In footage this range of sizes is 80% of the market.

These are the *small sizes* in which *machine-made* production and its resulting economies are essential to compete. This Model "T" Machine offers important savings ranging from 50% on the smaller down to 10% on the larger sizes. It doubles production—needs no Pallets and saves extra handling of B&S Pipe—permits handling double the business with half the inventory.

36" Pipe with eliptical steel cage—saves ½ the steel.



ONE 8-HOUR SHIFT PRODUCES:

PLAIN PIPE	SIZE OF PIPE	REINFORCED PIPE
2400 feet	4" to 12"	- - - -
1750 feet	12" to 18"	1600 feet
1200 feet	21" to 24"	1100 feet
- - - -	30" to 36"	900 feet

Exclusive Roller-Head, used in sizes 12" to 36", packs the 4" wall of 36" pipe like a Packer-Head packs the 1" wall of 10" pipe.

WRITE FOR DETAILS

CONCRETE PIPE MACHINERY CO.

10 GEORGE STREET • SIOUX CITY 17, IOWA

McCRACKEN PIPE Corrugated

PUBLICATIONS

Electrical failures—Symptoms and remedies for electrical failures in office and industry are illustrated in a 16-page brochure titled "Electrical Operation Headaches—How to Cure Them and Profit". Along with a prescription for stopping electrical troubles (survey, service and maintenance), the brochure lists "do's" and don'ts" in remodeling or installing new equipment. Among the problems considered are wiring, lighting, tele-communications, safety equipment and electronics. B. EICHWALD & CO., INC., 237 E 39TH ST., NEW YORK, N. Y.

Oil filtering—"No Short Cuts to Safe Filtering" is the title of a new 8-page booklet written about the risks involved in taking short cuts in the maintenance of lubricating oil filter systems. A discussion of what a filter must accomplish and a description of how a full-flow filtering system serves the engine are also included. Form 31085. CATERPILLAR TRACTOR CO., PEORIA, ILL.

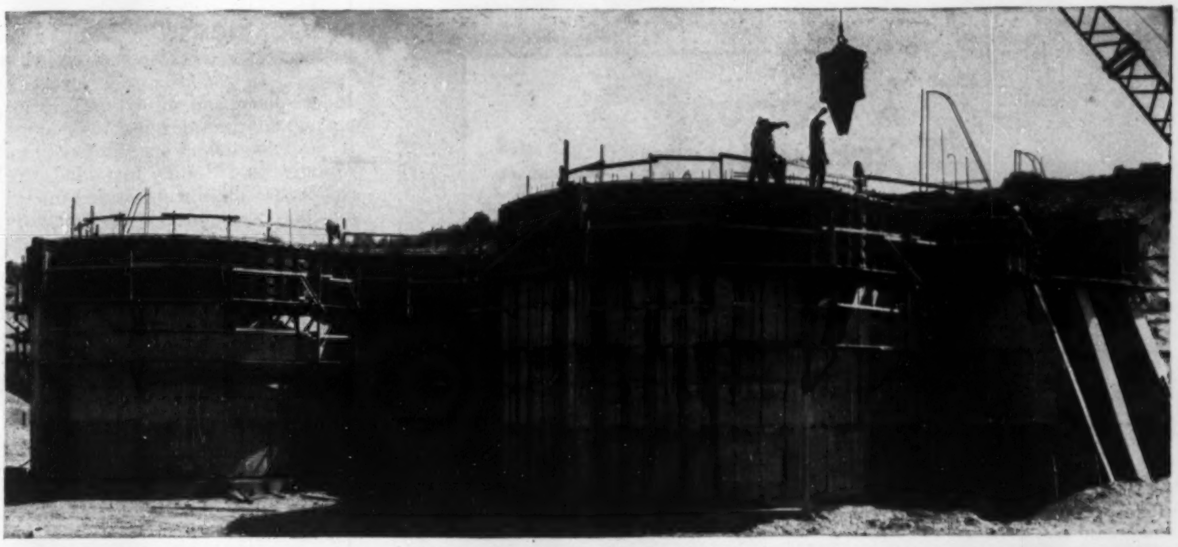
Hydraulic control valves—Dimensional data and features of hydraulic directional values for mobile equipment applications are provided in the newly issued 10-page catalog file 1551A. Material covers 1-, 2-, 3- and 4-spool models of from 8 to 35 gpm capacity. INDUSTRIAL HYDRAULICS DIVISION, THE PARKER APPLIANCE CO., 17325 EUCLID AVE., CLEVELAND 12, OHIO.

Space heaters—A line of warm-air space heaters designed for commercial and industrial establishments is described in Booklet 552. Eight pages illustrate design and construction features, application and installation, and also engineering data on oil or gas fired models with 200,000 or 250,000 Btu capacity. DRAVO CORPORATION, 1203 DRAVO BUILDING, PITTSBURGH 22, PA.

Long crawler excavator—A new bulletin—No. X-161—is now available on the ¾ yd, P&H long-crawler excavator. (Model 255 ALC). Description and illustrations of the complete machine, along with detailed information on the extra-long, wide crawlers are carried in the 4-page publication. HARNISCHFEGER CORP., SMALL EXCAVATOR DIVISION, 4609 WEST NATIONAL AVE., MILWAUKEE 46, WIS.

Steel chain—Entitled "Quick Facts About Chain", a new 4-page bulletin has data on chain for load binding

(*Continued on page* 302)



STORAGE WALLS to hold sand and gravel, designed and engineered by Kaiser Engineering Co. Symons Pre-Fab Fir Plywood Forms were called upon for the work because they could be prefabricated to fit the need and on the basis of savings in time and money. Butler Construction & Engineering Co., Seattle, Washington, is the contractor.

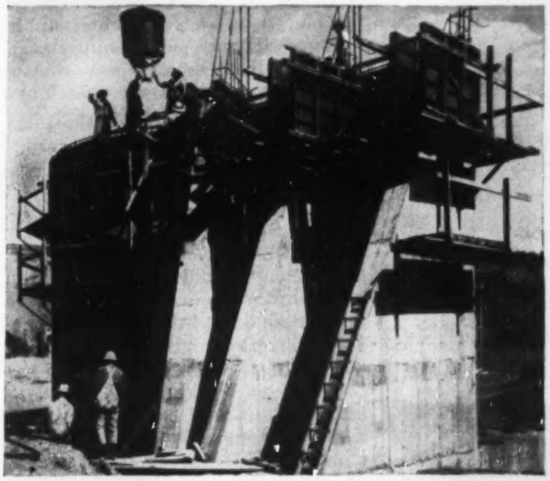
COST SAVINGS SELL SYMONS FIR PLYWOOD FORMS FOR 40 FT. HIGH "S" CURVED CONCRETE STORAGE WALLS

An unusual concrete construction job in Steilacoom City, Washington, involved the erection of two sharply curving free-standing concrete walls 40 feet high and 15 inches thick. The curves are shaped to a radius of 15 feet 6 inches. One wall is 190 feet long and the other is 400 feet long. They face each other across a space of 200 feet.

The curving surface of the walls posed a serious problem in forming. This was solved by the use of Symons Pre-Fab Fir Plywood Forms.

Most of the form panels were 2 x 6 feet with ¾ inch exterior *Plyform* faces framed on the edges with 2 x 4's and reinforced with steel cross members spaced 12 inches O.C. The job also required a number of filler panels 20 inches by 6 feet in which the plywood facing on each side extended past the framing 1⅛ inches, making it possible for the edges of the form to butt closely on the outside surface of the curves.

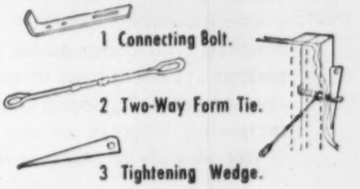
Symons Engineering and Customer Service also play an important role in projects where forming is a serious problem. The Symons Engineering Staff will furnish complete form layouts and job cost sheets on the form work—at no charge to the contractor. This service enables the contractor to get a clear picture of his job (its cost, bill of materials and labor saving methods). Symons fieldmen give regular on-the-job service. First, by on-the-job recommendations of forms and hardware needed. Second, by showing the workmen how to set up the forms efficiently. Third, by making special deliveries when last minute problems arise.



Abutment supporting ends of the 190-foot concrete sand and storage wall. Photo shows Symons Fir Plywood Forms being used for fourth pour on 40-foot high installation.

Symons Forming System includes just 3 pieces. TWO WAY FORM TIE which holds form securely to the required wall thickness without washers, spreaders or walers. Tie-ends are broken back within wall by a half-twist after forms are removed. TIGHTENING WEDGE is inserted through the slot in the connecting bolt and pulls form sides tightly together. CONNECTING BOLT which is slotted passes through edges of adjacent forms and tie loop.

JUST 3 PIECES



The Symons Forms are available on a Rental-Purchase Plan which offers contractors the opportunity to use the Symons Forming System on a rental basis . . . with all rental charges to apply on the purchase price, during a 60-day period.

Contractors throughout the country have tried this plan and like it. Send in your request for the complete facts—no charge or obligation.

SYMONS CLAMP & MFG. CO.
4265 Diversey Ave., Chicago 3, Ill. Dept. J-4

Please send catalog and information regarding:

☐ Forms ☐ Shores ☐ Column Clamps

Name____________________

Firm Name____________________

Address____________________

City__________Zone____State______

A UNIQUE APPLICATION OF THE TOGGLE PRINCIPLE

Lipe

CONSTANT-CAPACITY CLUTCH

Based on a unique application of the toggle principle, this LIPE constant-capacity CLUTCH compensates for wear of friction material . . . compensates for fading pressure of expanding springs . . . never loses torque capacity while there is a reasonable amount of friction material left to hold. The constantly increasing leverage of the toggle — which never goes over center—builds up pressure in almost direct ratio to these losses.

Toggle Action Insures Smooth Engagement

Despite its multiple pressure action and positive drive, the engagement of this clutch is gentle and chatter free. This is due (1) to the fact that the initial energy of the springs is partly absorbed by the toggles, and (2) to the fact that the rate of engagement is slowed by the reduced speed of the toggle as it approaches center.

High thermal efficiency is assured by a massive plate, ribbed for faster radiation, and cooled by positively generated air currents.

It's a clutch that is bound to change your ideas about clutch design, capacity and service. Write for specifications and performance data.

LIPE ROLLWAY Lipe-ROLLWAY CORPORATION
Manufacturers of Automotive Clutches and Machine Tools
Syracuse 1, N. Y.

PUBLICATIONS

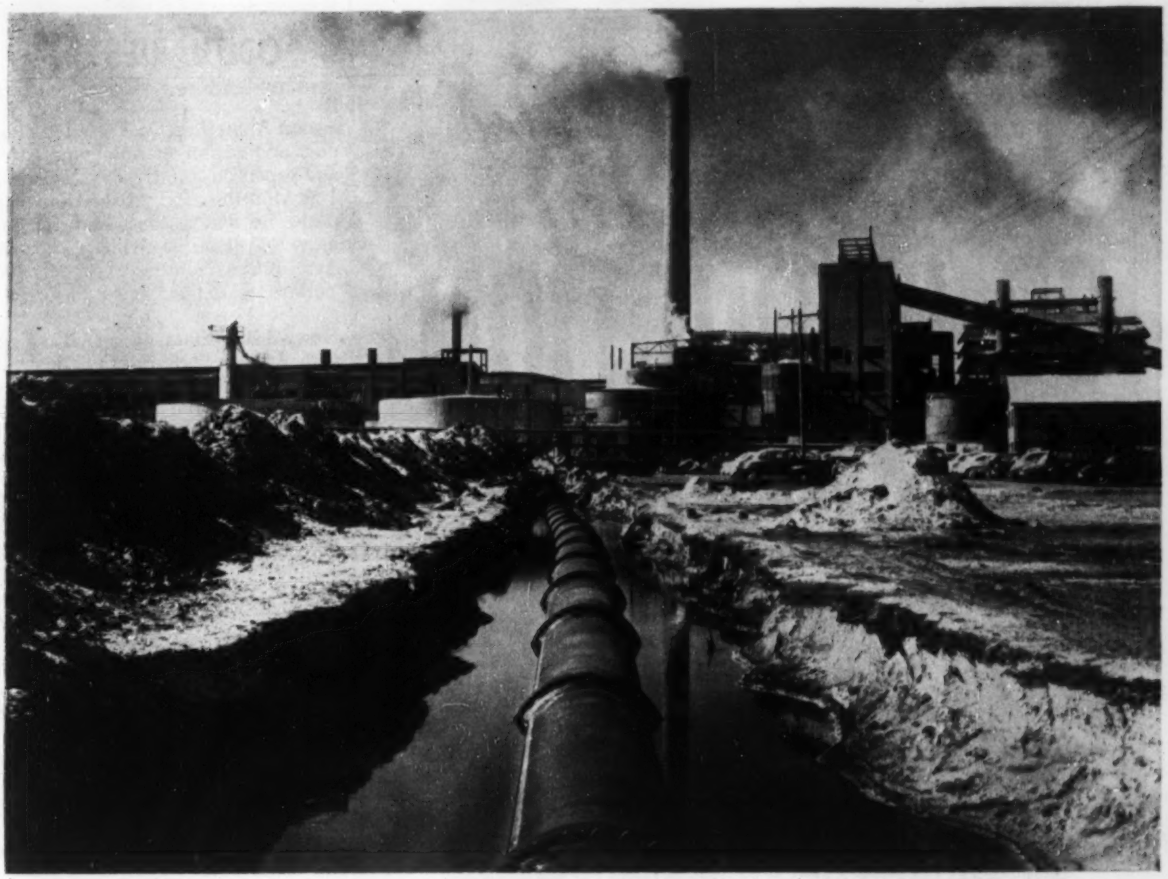
and tie-down, agricultural implements, towing, tail-gates, logging, railroad use. It also contains specifications and working load limits for alloy steel chain especially manufactured for lifting purposes. Joseph T. Ryerson, & Son, Inc., Box 8000-A, Chicago 80, Ill.

Construction equipment—A bulletin now available contains information on the Blaw-Knox construction package—all equipment necessary for building roads, highways and airports, or for the production of ready mixed concrete. Items listed in Bulletin 2463: base pavers, wideners, batching and mixing plants, clamshell buckets, concrete buckets, concrete finishers and spreaders, steel forms, subgraders, truck mixers, parts and services. Equipment Division, Blaw-Knox Co., Pittsburgh 38, Pa.

Gaskets—How flange surface finishes affect gasket sealability and joint performance is the subject of the latest in a series of illustrated technical bulletins on gaskets. This 12-page publication should be of help to those who buy, specify or design joints in which gaskets are used. It provides a basis on which to select the flange surface finish most suitable for a given gasket, and explains why the right finish makes it easy to achieve an initial seal and obtain the best joint performance. Johns-Manville, 22 E 40th St., New York, N. Y.

Brick and tile walls—This 7-page pamphlet tells the story of how the high heat storage capacity of brick and structural clay tile walls reduces the loads —and cost—of home air conditioning. A report on research conducted by the University of Texas on livability in warm climates and building design recommendations for warm climate areas are included. Structural Clay Products Institute, 1520 18th St., NW, Washington 6, D. C.

Remote control wiring—An up-to-date edition of GE's manual on remote control wiring includes new components recently added to the remote-control line—relay gang boxes, motor-driven master switch, locking switches, and the twisted construction, tion, color-coded remote-control wire. Within its 32 pages Manual 16-284 contains complete technical and installation data, including wiring diagrams, wiring layouts and specifications. Construction Materials Division, General Electric, Bridgeport 2, Conn.



AMERICAN Pipe for Permanence!

Being cast iron, AMERICAN pipe enjoys an enviable reputation. Cast iron pipe has had over 300 years of service abroad and more than 100 years of service in the United States. Manufactured in diameters 2" through 48", AMERICAN cast iron pipe gives complete job satisfaction. It is conveying chemicals, water, sewage, gas, crude oil, gasoline, salt brine, ashes—and in fact, just about everything that a pipe line can conceivably convey. Operating pressures range from a few psi up to pressures in excess of 100 psi gas and 500 psi liquid. Pipe and fittings can be alloyed for special corrosion resistant service or furnished with high hardness for erosion resisting services.

AMERICAN pipe is made to required wall thicknesses for specific operating conditions. You get the exact pipe your conditions require. It is equipped with any of a wide variety of joints including Double-X Mechanical Joint, Screw-Gland, Plain Ends, Threaded and Coupled Ends, Molox Ball Joint River Crossing Pipe, Roll-On Joint, Flanged, or Bell and Spigot.

Manufactured by the Mono-Cast centrifugal process, AMERICAN pipe has the lasting strength that enables it to survive continued corrosive attack, year after year, and to keep on giving the same dependable, economical service as the day it was installed. You can lay it and forget it.

Refer your next piping job to AMERICAN CAST IRON PIPE. Let us assist you by taking off lists of material and submitting prices on pipe and fittings for your next job—preferably when planning begins. Consulting with us will not impose an obligation.

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OBITUARIES

Ernest A. Sterling, 76, consulting engineer and author of numerous articles and papers on forestry, died September 1 at Montrose, Pa. At the time of his death he was a consultant for such firms as Johns-Manville Corp. and American Creosoting Co. of New York.

Howard B. Grimes, 46, a civil engineer with Atlantic Refining Co., died September 3 at Reading, Pa. He had been a member of the firm's Philadelphia staff for the past 18 years.

Linn C. Fuller, resident engineer of South Carolina State Hospital in Columbia, died in Spartanburg, S. C., early this month. He had represented hospital engineers and architects on some $6 million of new construction.

Charles M. Nelson, 47, editor of Better Roads for the past 23 years, died in Chicago September 2. He received his civil engineering degree from Armour Institute of Technology in 1929.

Julius Martinelli, 69, San Francisco contractor for 50 years, died August 31. His firm, Martinelli Construction Co., built many of the city's public schools and office buildings.

Albert F. Damon, Jr., 81, for 33 years a partner in Damon & Foster engineering firm, Sharon Hill, Pa., died September 8. An authority on sewage treatment plants, he served as public works bureau engineer for Upper Darby Township and also as engineering representative of the Pennsylvania Water and Power Resources Board. He received his civil engineering degree from Penn State University.

Alfred M. Nygren, 52, a consulting engineer with Lockwood Greene Engineering, Inc., New York City, died September 13. He was graduated from Cornell University in 1922.

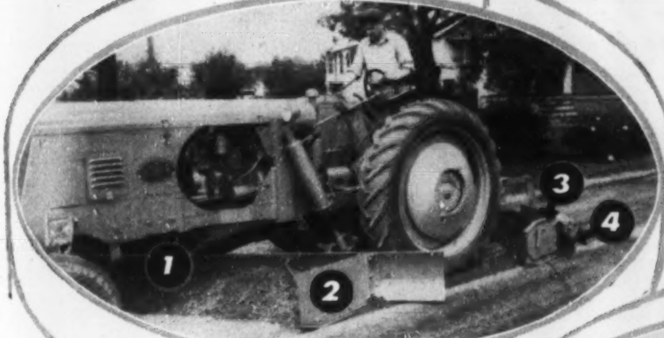
Col. E. Clarence Gere, civil engineer and retired Army officer, died September 10 in Syracuse, N. Y. While stationed in the Philippines in 1919 he corrected difficulties in the water supply and sewage disposal on Corregidor Island. Later he served as chief of the utilities branch and chief of the construction branch in the Office of the Quartermaster General, Washington, D. C.

Addison T. Jackson, 69, former New Albany, Ind., city engineer, died Sep-

(*Continued on page 306*)

HOW HUBER SOLVES

Two Special Problems



SMOOTH BERMS IN ONE PASS

Hydraulically controlled blade (1) pulls in berm material to edge of pavement where gathering blade (2) carries it until needed to fill low spots. Rear wheel compresses fill material. Hydraulically controlled berm leveler (3) removes and feathers-out excess material. Cleaner blade (4) sweeps pavement clean.

CLEANING UNDER GUARD RAILS

Huber Side Dozer attachment enables Maintainer to scalp berms and shoulders under any guard rail 6″ or more off ground. Hydraulic action pushes 48″x6″ blade to remove sod and gravel, formerly a laborious hand operation. Side dozer has 72″ reach.

THESE ARE ONLY TWO OF THE JOBS

a versatile Huber Maintainer can do. Other attachments convert it to a bulldozer, lift loader, highway mower, snow plow, broom, road planer or patch roller. Its 42½ horsepower puts a heavy push behind its 9-foot moldboard, and its 6,000-pound weight, ability to travel at pick-up truck speeds and to turn and work in close quarters make it a favorite tool for many classes of work.

NOTE TO CONTRACTORS

Talk with the political subdivisions in your area about handling their berm leveling and guard rail cleaning problems on a contract basis.

HUBER MANUFACTURING CO. • Marion, Ohio, U. S. A.
Manufacturers of Huber Maintainers, Graders and Complete Line of Rollers

HUBER

Versatile

INDUSTRIAL SOLVENT PUMP

(FIGURE 4703)

Features of this unit extend its scope of applications from pumping gasoline and oil from underground tanks to pumping many kinds of industrial solvents and other liquids.

For hazardous conditions, this pump is furnished with a vertical solid shaft explosion proof motor. Standard open type motor is furnished for non-hazardous conditions.

Since the Turbine assembly is always submerged, the liquid is actually pushed through the system in a steady continuous flow. Pumps are self-venting and do not vapor lock. Priming difficulties are eliminated and instant delivery of gasoline assured, regardless of outdoor temperature conditions.

Other features of this efficient pumping unit merit your investigation. Capacities range from 15 to 75 g.p.m. for pressures up to 100 lbs. (depending upon capacity).

Write for complete details.

THE DEMING CO.
536 Broadway • Salem, Ohio

Specify- DEMING PUMPS

tember 13. He held the city post for 10 years and also served as Floyd County surveyor.

Edward L. Cox, 89, formerly a construction superintendent for Frank O'Hare Contractors, New York City, died September 14 in Elizabeth, N. J. He worked for the contracting firm for 51 years before retirement in 1934.

Walter E. Smalley, 52, general superintendent for J. A. Jones Construction Co. on Hoover Dam project, was killed September 16 when he stumbled over a channel iron on the dam and fell 37 ft. His home was in Grand Junction, Tenn.

Ray E. Havens, former Kokomo, Ind., city engineer, died August 20. He also had served as an engineer for the Indiana highway department, the Pennsylvania Railroad and the Vincennes Bridge Co.

Jean W. Ferguson, 72, former resident engineer with the North Carolina highway department, died September 12 in Raleigh. He retired in 1952 after 29 years service with the department.

Rush Sill, 72, partner in Ruscardon Engineers, Los Angeles, was killed in a plane crash at Baja California, Mexico, August 19. An expert on tunnel construction, he served as consultant for the Los Angeles Department of Water and Power and the Los Angeles County Flood Control District, and also was a member of the board of engineers that investigated Tecolote Tunnel construction problems.

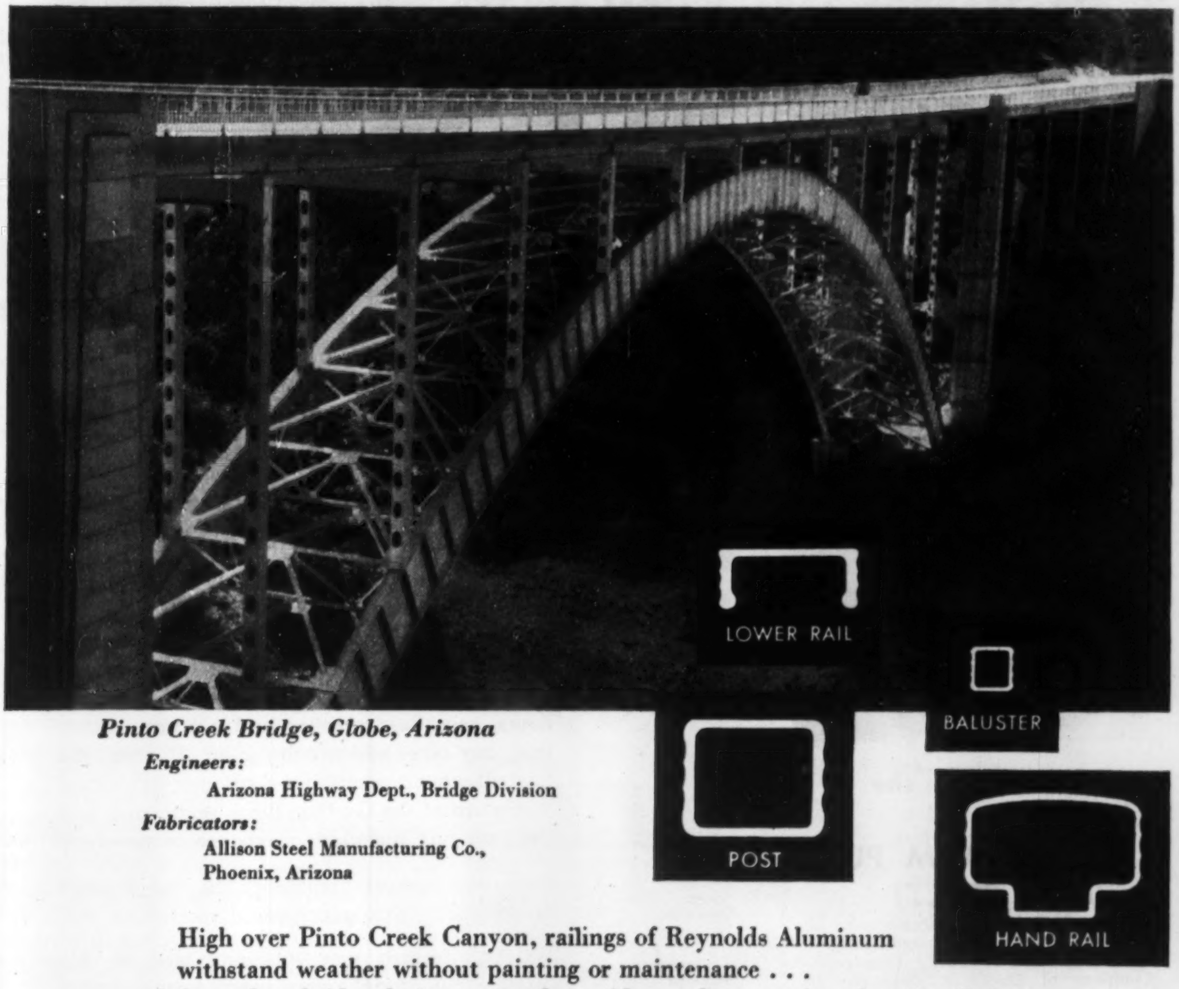
Walter E. Burt, 68, vice-president and general manager of Indiana Bridge Co., died in Muncie, Ind., September 10. He joined the firm in 1910, a few years after graduation from Tri-State College at Angola, Ind.

Walter K. Shaw, 64, former vice-president and treasurer of Turner Construction Co., New York City, died in Scarsdale, N. Y., September 11. He joined the company as an assistant engineer in 1913 after graduation from Cornell University.

Natt McDougall, 74, retired president of Natt McDougall Co., Portland, Ore., general contracting firm, died September 2. His engineering-construction career began in 1899 and included work on Pacific Northwest bridges, dams and railroad-highway grade projects.

High Proof of Performance . . .

ALUMINUM BRIDGE RAILINGS



Pinto Creek Bridge, Globe, Arizona

Engineers:

Arizona Highway Dept., Bridge Division

Fabricators:

Allison Steel Manufacturing Co.,
Phoenix, Arizona

High over Pinto Creek Canyon, railings of Reynolds Aluminum withstand weather without painting or maintenance . . . fit modern bridge design . . . and provide ample strength at low installed cost. This railing is the "vertical" type, assembled entirely from extruded sections (profiles shown). These extrusions are standard, produced on order from standard dies. Other types of bridge railings utilize Reynolds Aluminum Pipe, which is a standard mill product available through regular distributors. For sources of standard products and for advice on special aluminum requirements, call the nearest Reynolds office listed under "Aluminum" in classified directories. Or write to **Reynolds Metals Company,** General Sales Office, Louisville 1, Kentucky.

For quick reference see Catalog $\frac{5a}{Re}$ *in Sweet's Architectural file.*

REYNOLDS ALUMINUM

SEE "MISTER PEEPERS," starring Wally Cox, Sundays, NBC-TV Network.

(Advertisement)

PUMP EXPERTS STUDY CONTRACTORS' PROBLEMS

Contractors who have ever had a pump fail on the job realize the importance of choosing the proper pump.

A pump failure may hold up the job, cause men to be idle, tie up other equipment, or even prevent finishing the contract on time.

The best insurance is to have a pump that has proved itself on many tough assignments.

The Gorman-Rupp Company of Mansfield, Ohio claims that their pumps will out-perform any pump of comparable size and type on the market. So states their guarantee. The greater capacity of these pumps when working against high heads is very important to the contractor. They are the simplest of pumps and practically trouble-free. They never quit on the job. Years of study and research by engineers in the field and the laboratory have made possible these claims and the guarantee.

FIELD NOTES *on the* BEST DIAPHRAGM PUMP *EVER BUILT!*

With mud, sludge and water seeping into a 28 foot pit for an industrial sewer installation, W. W. Purdy Construction Company of Mansfield, Ohio put this Gorman-Rupp 3" diaphragm pump 3D-8R6, on this job at the Empire Steel Corporation factory at Mansfield.

A junction of several six-foot storm sewer tiles was necessary. Rapidly rising water in the 12 x 22 foot pit flooded out workmen and 18 inches of mud and slime accumulated in the pit. The Gorman-Rupp diaphragm pump cleaned out the pit and had the workmen back on the job in 30 minutes.

This job involved an 18 foot suction lift, 8 foot discharge elevation and about 35 feet of horizontal 3" hose discharge line into an open manhole. No attention was necessary except fuel supply and starting or stopping when required. The unit is self-priming. It was necessary to operate the unit several minutes every hour.

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

GUARANTEED!

TO PUMP MORE WATER

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125 M PUMP

and doing it on-the-job EVERY DAY!

NO OTHER PUMP, SIZE FOR SIZE, CAN EQUAL ITS PERFORMANCE

Our distributors are authorized to put a Gorman-Rupp Contractors' Pump on any pumping job, any time, anywhere, alongside any other make pump, size for size. The Gorman-Rupp pump is guaranteed to pump more dirty water more hours, using less gasoline and to prime quicker than any other self-priming pump. If it isn't the best all-around pump, our distributor will accept the return of the Gorman-Rupp pump and pay the user any installation expense incurred.

Only the utmost confidence in the product could justify this guarantee.

We can furnish you with any size of self-priming centrifugal pump ranging in capacity from 1½ in., 5,500 G.P.H. to the powerful 10 inch, pumping 240,000 G.P.H.

Ask for Contractors' Pump Bulletin No. 4—CP-11

GORMAN RUPP PUMPS

SOLVE YOUR PUMPING PROBLEMS

GORMAN-RUPP
SELF-PRIMING
CENTRIFUGAL PUMPS

THE GORMAN-RUPP COMPANY
MANSFIELD, OHIO

LEGAL

Damages are limited for breach of contract

A contract was entered into for the installation of a heating and cooling system. The contract price was $6,200. After the contractor had been paid $4,200, the owner of the building employed another contractor to complete the work at a cost of $2,361. The owner then brought an action against the first contractor to recover $2,361, the cost of completing the work. The court limited the owner's recovery to $361, that is the total amount paid by him to perform the work, less the amount of the original contract price.[1]

The court in its opinion stated: "It is not the policy of our law to award damages which will put a plaintiff in a better position than if the defendand [contractor] had carried out his contract. * * * The fundamental principle upon which the rule of damages is based is compensation. * * * Compensation is the value of the performance of the contract, that is, what the plaintiff would have made had the contract been performed."

---

(1) Ficara v. Belleau, 117 N.E. 2d 287, Supreme Judicial Court of Massachusetts, Jan. 27, 1954.

Delays on government work

A contractor entered into a lump sum contract with the U. S. Army Corps of Engineers to enlarge an existing water treatment plant. Pursuant to the terms of the contract, the government was to furnish the cast iron pipe, fittings and valves required for the work, which was to be completed in 61 days. Owing to delays on the part of the government in furnishing the needed material, the contractor was unable to proceed with the work in the orderly progress contemplated when the bid was submitted, with the result that there was a delay of 71 days in completing the work and an alleged increase of cost of $38,390.

In an action brought to recover this sum the contractor was allowed $19,195, the court finding that this was the amount of damage sustained by the contractor as a result of delays caused by the negligent acts of the agents of the government.[1]

The court in its opinion stated: "Generally, even though the government may fail for justifiable reasons to secure timely delivery of materials which, under a construction contract, it is required to furnish, no liability

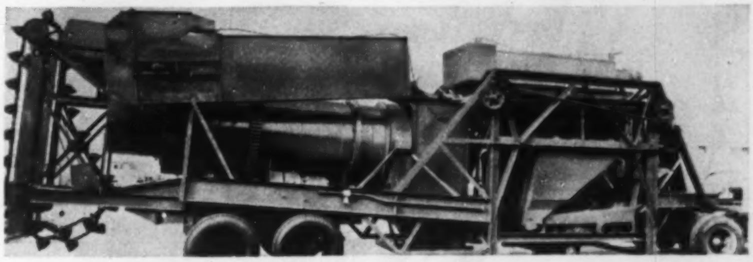
(Continued on page 310)

Announcing A NEW STANDARD

PORTABLE BATCH TYPE ASPHALT PLANT

(MODEL TM)

At last . . . a completely portable *batch type* asphalt plant . . . designed to meet the demand for a plant portable enough to move economically yet provide the capacity and accuracy required for specification work. Capacity is 40 to 50 tons per hour. Ordinarily operated by one man. The exclusive STANDARD "Self-Lift" erecting device elevates the mixing cage in as little as 30 minutes. Fast dismantling, hauling and erecting eliminates need for long, expensive asphalt hauls.



HAUL IT *Anywhere!* Perfect for rural areas . . . for hard-to-reach locations, for state highways and county and township roads. Truck tractor hauls plant easily. Now you can profitably handle jobs that size and distance formerly eliminated or made extremely expensive.

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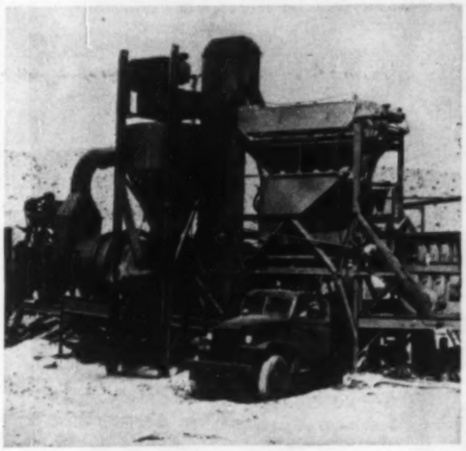

The push button operated "Self-Lift" *automatically* raises or lowers the mixing section in minutes. The entire unit, including cold and hot elevator, can be put in working position in as little as 2½ hours. Estimated erection or dismantling time for complete plant, including boiler and storage tank, is approximately one day. Built for years of the most rugged service, the STANDARD portable plant will stand up under both heavy asphalt production and the added stress and strain of constant erection, dismantling and road shock.

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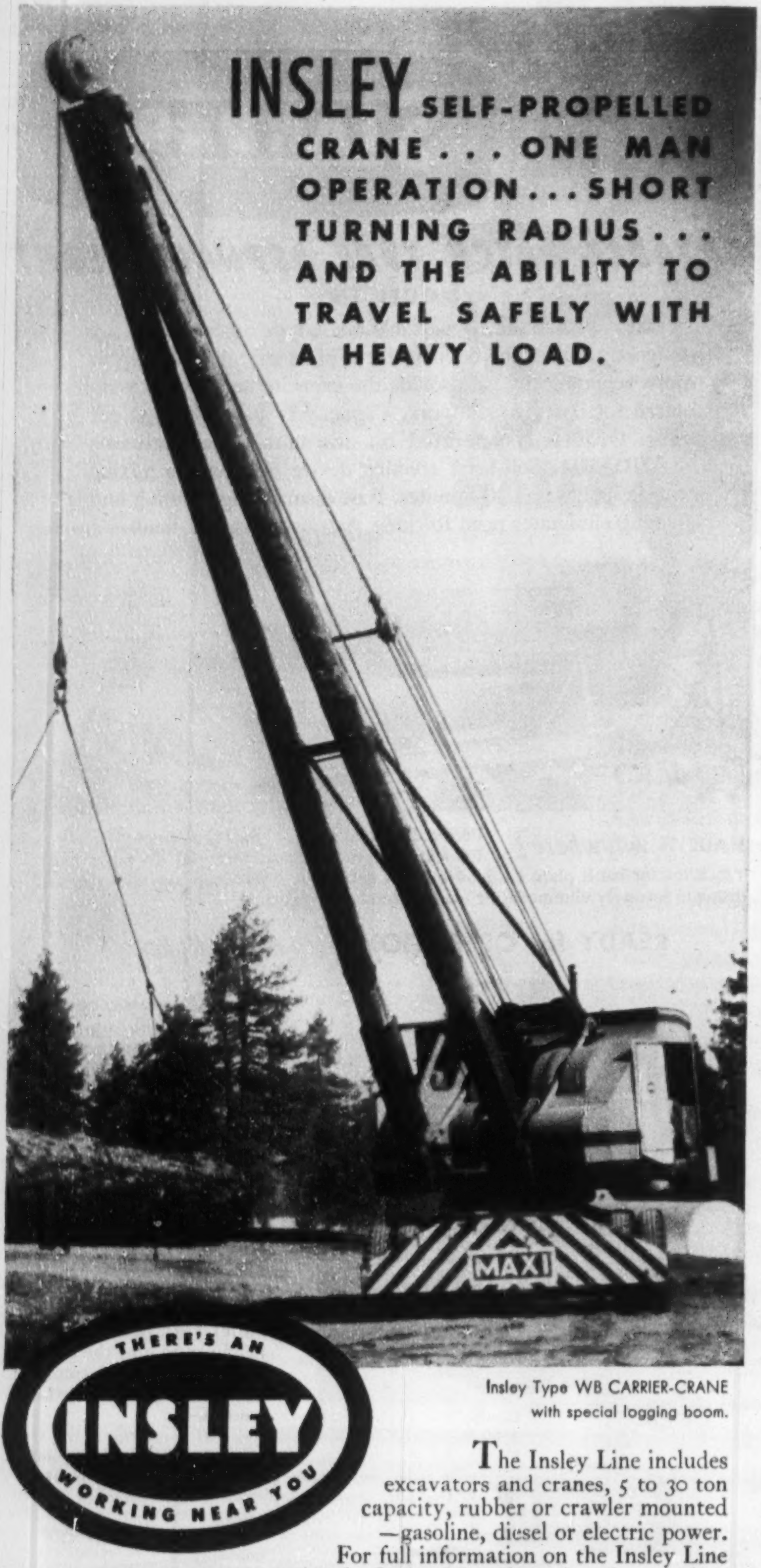
INSLEY SELF-PROPELLED CRANE . . . ONE MAN OPERATION . . . SHORT TURNING RADIUS . . . AND THE ABILITY TO TRAVEL SAFELY WITH A HEAVY LOAD.
MAXI

THERE'S AN INSLEY WORKING NEAR YOU

Insley Type WB CARRIER-CRANE
with special logging boom.

The Insley Line includes excavators and cranes, 5 to 30 ton capacity, rubber or crawler mounted —gasoline, diesel or electric power. For full information on the Insley Line write the Insley Manufacturing Corporation, Indianapolis 6, Indiana.

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for resulting delays will attach, unless it can be found that its representatives were at fault. United States v. Foley, 329 U. S. 64, 67 S. Ct. 154, 91 L. Ed. 44; Barling v. United States, Ct. Cl., 11 F. Supp. 878; Cf. (compare) Torres v. United States, Ct. Cl., 112 F. Supp. 363. We think there was fault on the part of the defendant in this case.

"There is present, in a contract such as this one, an implied obligation on the defendant that it will not do that which will hinder the contractor in the performance of the contract. When the contractor is delayed by a negligent act chargeable to the government, it is a breach of this clearly implied obligation, and the government is liable for the damages sustained by the contractor because of the delay. Fuller Co. v. United States, 69 F. Supp. 409, 108 Ct. Cl. 70; Kehm Corporation v. United States, 93 F. Supp. 620, 119 Ct. Cl. 454; Cf. (compare) J. J. Kelly Co. v. United States, 69 F. Supp. 117, 107 Ct. Cl. 594. In the absence of evidence to the contrary, when one party agrees to furnish particular materials to be used by the other, he must be held to have agreed 'to furnish them in time to be installed in the ordinary and economical course of the performance of the contract.' Walsh v. United States, 102 F. Supp. 589, 591, 121 Ct. Cl. 546, 554-555.

Defendant is guilty of just such a breach here. Its officials were negligent, not only in failing to use due diligence in expediting delivery of materials once the work had begun, but in their failure to place their purchase orders so as to permit timely delivery. Unlike the Barling case, supra, here it has been shown that the defendant knew prior to giving plaintiff notice to proceed that it would be impossible to secure delivery of the necessary pipe and fittings in time to enable the work to proceed in an orderly manner. The facts clearly show this. Procurement officials knew that delivery could not be made until a date which would make completion within the required time impossible. They failed without cause to act in this regard with reasonable promptness. Possessed of such knowledge, it was a breach of contract on the part of the defendant to give plaintiff notice to proceed, requiring plaintiff to begin one day after notice and to complete work on Aug. 17, knowing that the necessary pipe and fittings needed in the filter house would not begin to be delivered by suppliers until the end of the first week in August. Purchase orders for a few items were placed on June 14,

(*Continued on page 312*)

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New, Improved
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Yours for Just One Dollar!

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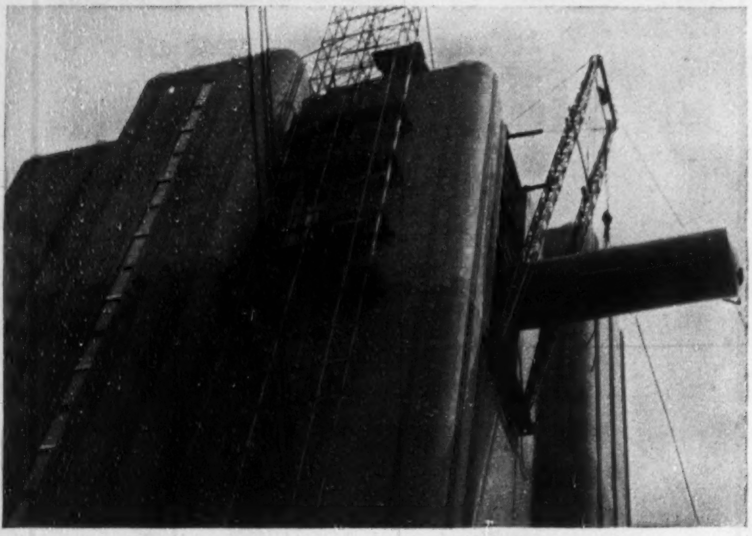
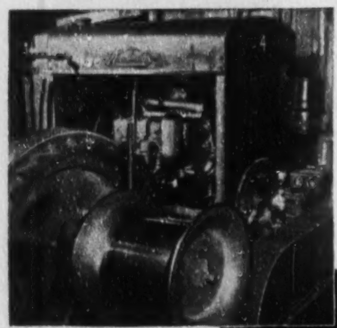
17-ton glass-lined Tank going up to top story of stockhouse 198 feet high



highest hoist
at MILLER HIGH LIFE...with
WAUKESHA



Built in 3 phases, Stockhouse I at Miller Brewery, Milwaukee, stores ¼-million bbls. Miller High Life in 240 tanks. Each 1070-bbl. glass-lined tank is 45′ long, 11′6″ diam., weighs 34000 lbs. In the third construction phase, 80 tanks were hoisted to 4 top stories of this 12-story, 198-ft. high stockhouse. Five weeks, 2100 ft. of cable, and *Waukesha power* did the job.

257

Price Erecting Co., Milwaukee, used a **Thomas Winch** with a six cylinder, 4⅜-in. x 5⅛-in., 517 cu. in. **Waukesha Power Unit** with a Twin Disc torque converter.

WAUKESHA ENGINES and POWER UNITS 10 hp. to 600 hp.

Send for Bulletin 1079

WAUKESHA MOTOR COMPANY
Waukesha, Wisconsin
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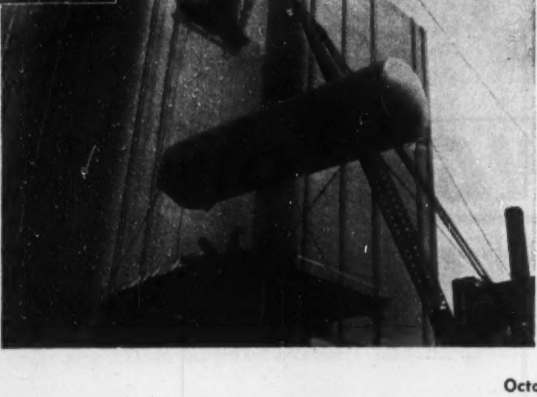


but most of the heavy piping required for the filter house was not ordered until June 19. Some of the orders for the piping materials were placed as late as the first of August, with delivery being made in late September.

It must be pointed out that from the supplier's standpoint there was no delay in the delivery of the pipe and fittings since the government was given delivery on the dates promised. The fault was that of the defendant. All efforts at expediting that transpired during the progress of the work were not caused by any default on the part of the supplier but were efforts to effect delivery prior to the promised dates. Under these circumstances we are of opinion that the defendant is liable for that portion of the loss sustained because of the late delivery of government-furnished materials."

(1) Chalender v. United States, Ct. Cl., 119 F. Supp. 186, March 12, 1954.

Failure to pay installments is a breach of contract

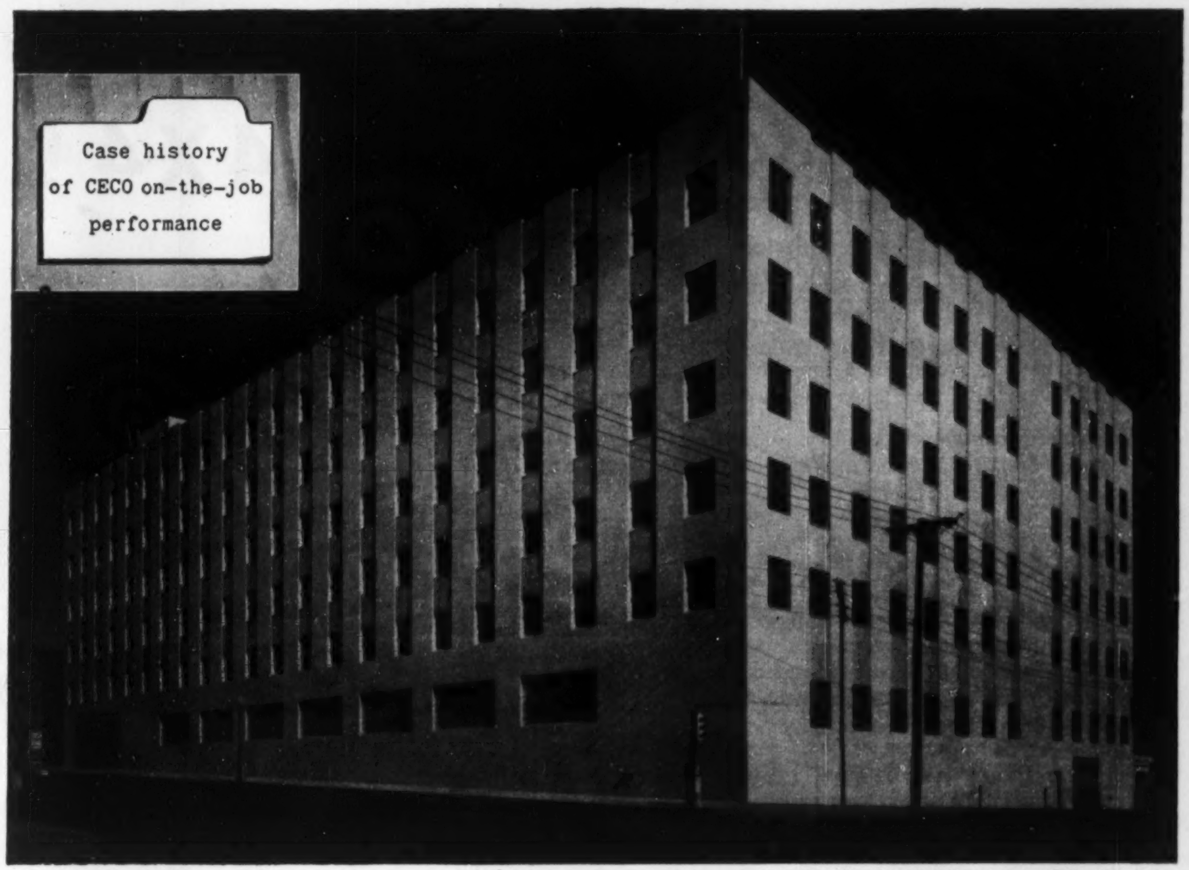
"Failure to make monthly progress payments when due was a material breach of contract, entitling plaintiff [contractor] to suspend work until the overdue payments were made. Guerini Stone Co. v. P. J. Carlin Const. Co., 248 U.S. 334, 39 S. Ct. 102, 63 L. Ed. 275; Underground Construction Co. v. Sanitary District, 367 Ill. 360, 370."[1]

Where under a contract, labor is to be performed and materials furnished over a period of time, involving large expenditures on the part of the contractor, and installment payments are to be made through such period as the work progresses, the covenant on the part of the contractor to perform is dependent upon that of the other party to make the stipulated installment payments substantially at the times stipulated in the contract, and in the absence of circumstances excusing it, the failure to pay such installments when due, will justify the contractor's refusal to complete the work.[2]

The rule is almost universal, that the failure to make the installment payments called for by the contract constitutes a breach of contract and will justify the contractor's abandoning the work and seeking a recovery.

(1) J. J. Brown Co. Inc. v. J. L. Simmons Co., Inc., 118 N.E. 2d 781, Appellate Court of Illinois, April 18, 1954.
(2) Pickens County v. National Surety Co., 13 F. 2d 758 and numerous cases there cited.

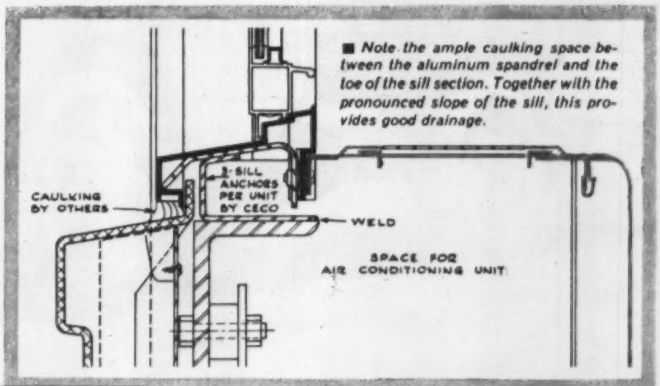
(These summaries of court decisions are prepared by I. Vernon Werbin, New York attorney and civil engineer.)



Sinclair Building, Tulsa, Okla./Architect, Hugh R. Humphreys

How Ceco Aluminum Windows solved two architectural problems...

Achieving striking architectural effects draws upon the imagination of the architect . . . adapting products to realize the design poses another problem. Architect Hugh R. Humphreys found the solution for Tulsa's new Sinclair Building in Ceco-Sterling Aluminum Double-Hung Windows. An unusual building design was created through the use of aluminum panel spandrels . . . Ceco Aluminum Windows were a perfect complement to the spandrels and likewise met the air conditioning problem. A simple but effective tie was made between the window and air conditioner cover. Ceco engineers helped develop the economical yet positive sill anchor. Architect Humphreys gives another reason why Ceco Aluminum Double-Hung Windows were used: "Their stainless steel weatherstripping holds air infiltration to a minimum." Ceco Aluminum Windows need no painting . . . will outlast any structure. Next time call Ceco Product Specialists to help solve your building problems.


CAULKING BY OTHERS
2 SILL ANCHORS PER UNIT BY CECO
WELD
SPACE FOR AIR CONDITIONING UNIT

■ *Note the ample caulking space between the aluminum spandrel and the toe of the sill section. Together with the pronounced slope of the sill, this provides good drainage.*

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A two-speed transfer case affords eight forward and two reverse speeds, permitting movement of men, tools, and equipment over all kinds of terrain. *Two transmission power take-off openings allow operation of front-mounted winch, hydraulic hoist, or other auxiliary equipment. There is provision for mounting a third power take-off on the transfer case.*

INTERNATIONAL 4x4 trucks have everything it takes for tough construction assignments, plus extra easy steering and handling, famous driver-designed Comfo-Vision cabs. Study the extra-value facts shown here, then get complete details from your INTERNATIONAL Dealer or Branch.

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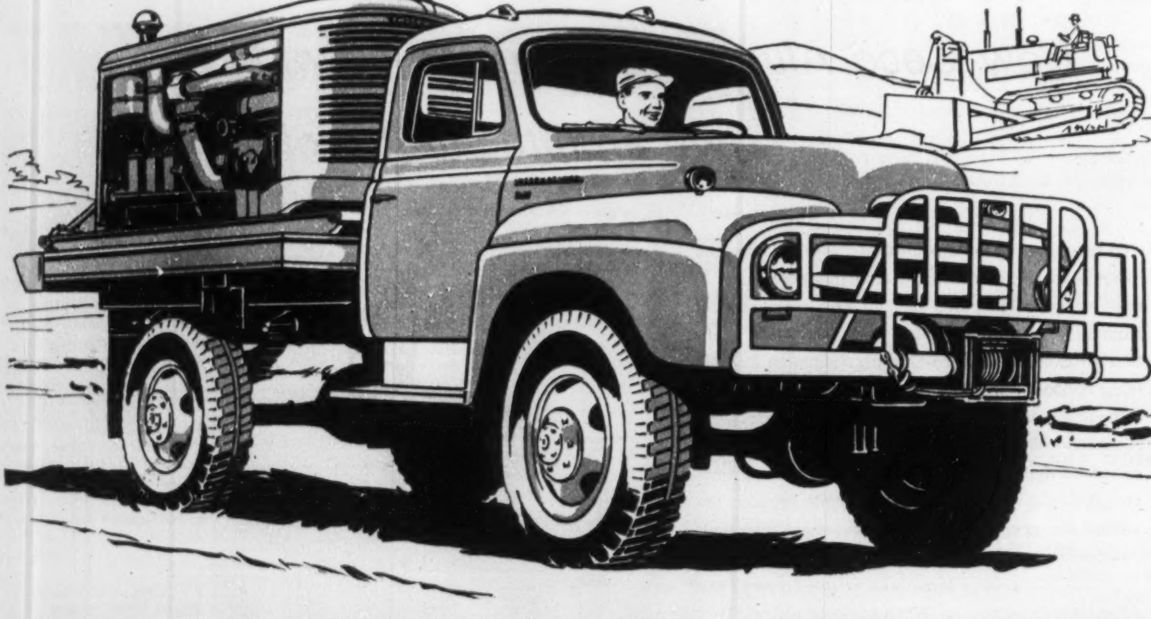
Two chassis models: Model R-140 (4x4), 130- and 142-inch wheelbases, GVW rating, 11,000 pounds. Model R-160 (4x4), 154- and 172-inch wheelbases, GVW rating, 15,000 pounds.

All-truck power: Both models powered by famous INTERNATIONAL Silver Diamond engines.

Transmission: Sliding gear selective type. Four speeds forward, one reverse. Power take-off openings on right and left sides.

Transfer case: Two-speed declutching type, providing eight forward and two reverse speeds, with manual disengagement of front axle for normal two-wheel-drive operation. Three-position shifting—high, 1.00 to 1; low, 1.87 to 1; and neutral. Provision for mounting full torque power take-off at rear of input shaft.



Four-wheel-drive INTERNATIONALS provide new standards of efficiency and stamina for a wide variety of construction jobs. Shown is an R-140 (4x4) with portable compressor mounted on flat-bed body.

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INTERNATIONAL TRUCKS

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BOOKS

Do residual stresses hurt?

Residual Stresses in Metals and Metal Construction — Prepared by the Ship Structure Committee and edited by William R. Osgood. 363 pp. Reinhold Publishing Corp., 330 W. 42nd St., New York 36, N. Y. $10.

Stress analysts of recognized ability hold conflicting opinions as to the actual influence of residual stresses on structural performance. Some contend that stresses locked into a structure as a result of fabrication practices do not contribute materially to failure, whereas others argue that these stresses can and do influence failure significantly.

Because of the possibility that some ship failures may have been due to residual welding stresses, the Ship Structure Committee, which is composed principally of representatives of several federal agencies concerned with shipping, sponsored the publication of a monograph to assess the present state of knowledge of residual stresses.

The book was assembled under the direction of the Committee on Residual Stresses of the National Academy of Sciences–National Research Council. It contains 22 papers and a summary contributed by specialists in the field.

The consensus appears to be that if macroscopic plastic flow can take place safely, residual stresses will have no pronounced effect on the performance of a structure. If plastic flow is restrained, however, as under conditions of triaxial stressing, of inherent brittleness, or of exhausted ductility, then residual stresses combine with any other stresses present and the effect is the same as the effect of any combined stress, regardless of how the stress originated. In general, brittle materials seem to react in the same way as glass, which is known to be especially breakable in the presence of residual stress.

Applied nuclear theory

Introduction to Nuclear Engineering—By Raymond L. Murray. 418 pp. Prentice-Hall, 70 Fifth Ave., New York 11, N. Y. $9.35.

Here is a textbook that should be very helpful to engineers who may have to design or build facilities that will enclose radioactive materials. It presents in clear, simple language the fundamentals of atomic physics and

(Continued on page 316)

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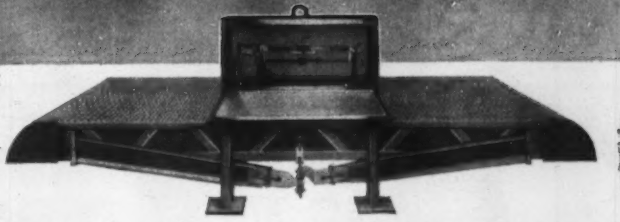

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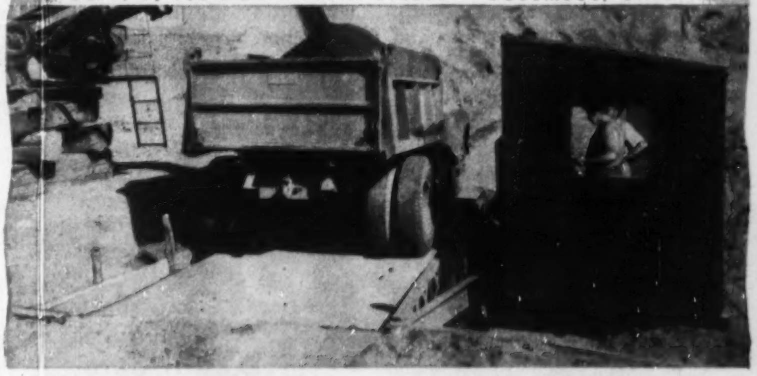

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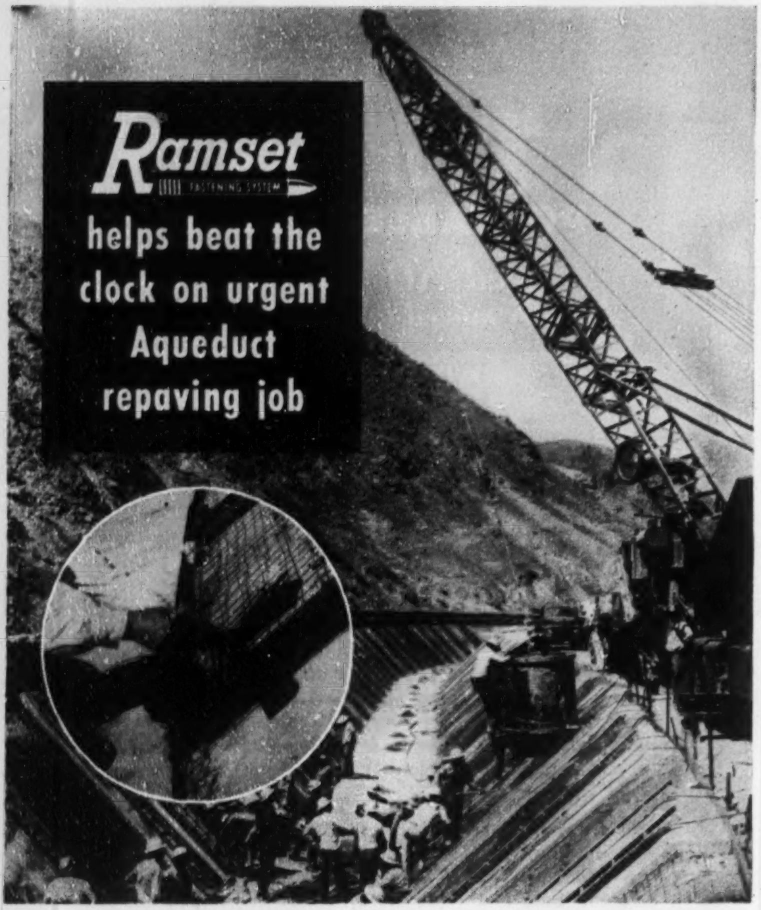

... and saves $2,380 in fastening costs

TIME was the big factor in resurfacing the Lone Pine Section of the Los Angeles-Owen River Aqueduct. Wood and steel forms had to be fastened to the old concrete. Steel wire mesh reinforcing must be supported. Old-fashioned methods were too slow. By using RAMSET JOBMASTERS and 6" Tru-Set drive pins to do the anchoring work, the time schedule was met and an estimated $2,380 saved in fastening costs.

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tackles from an engineering viewpoint the problems involved in applying these principles.

As might be expected, the author places heavy emphasis on design and operation of nuclear reactors. But he also sheds light on the handling of radioactive chemicals or wastes, design of instruments for experimental particle detection and nuclear propulsion of aircraft, submarines and rockets. In addition, he examines the economic feasibility of obtaining electrical power from fissionable fuel.

Some of the sections that will be most useful to civil engineers undoubtedly are those dealing with the properties of rays and particles from radioactive materials and the design and construction of adequate shields. A variety of emanations arise from radioactive decay and fission, the author points out: alpha particles, beta particles, gamma rays, neutrinos and neutrons. Only the gamma rays and neutrons require appreciable thicknesses for protection. A combination of density and large numbers of electrons per atom is the requirement for a good gamma shield. On the other hand, a neutron shield must provide targets that will slow down fast neutrons, and for this purpose, materials with a large hydrogen content, particularly water, are best. Obviously, shield design is not simple. Consequently, this book will be a handy guide for non-specialists in this field.

How steel structures act

THE STEEL SKELETON—Vol. 1: Elastic Behavior and Design—By J. F. Baker. 206 pp. Cambridge University Press, Cambridge, England and 32 E. 57th St., New York, N. Y. $8.50.

This book presents a description of strain-measurement tests in the elastic range made on steel-frame buildings and a history of the design recommendations that were developed from this research, which was carried out in Great Britain since 1929. Vol. II, when published, will deal with research and design recommendations taking into account plastic behavior of steel.

The tests described in the book indicated that buildings behaved radically different from the assumptions on which design methods in common use are based. The structures acted more like rigid frames than an assemblage of members with hinged connections. As a result, the author concludes that a rational design method for multistory steel buildings should be based on rigid-frame action.

(*Continued on page* 318)

what's new in construction?

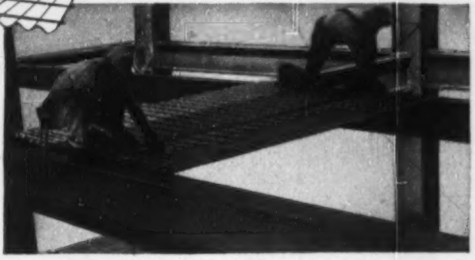
"TOUGH-TEMPER" STEEL AND A NEW FAMILY OF PRODUCTS HELP DESIGNERS AND INVESTORS, ALIKE

Here's How: "Tough-temper" steel is the answer. Yes, a steel with extremely high strength is one of the reasons that the Granco family of four building products does a better job for architects, engineers, and new building owners.

The new material, known as "tough-temper" steel does not require critical alloying to gain high-tensile strength. Instead, controlled cold-rolling with strain hardening as the result, gives high and unusual physical properties. The finished product, containing this steel with an ultimate strength over 100,000 psi, results in simplified, economical construction, savings in material and labor.

For additional information, write Department ER-4, Granco Steel Products Co., Granite City, Illinois. Your request will receive prompt attention.

COFAR—combined form and reinforcement



Deep-corrugated steel, 100,000 psi and stronger (main reinforcement), and T-wires (temperature reinforcement) in one manufactured product . . . serves as both permanent form and reinforcement . . . completely eliminates wood forms . . . provides all the positive steel needed in the structural concrete slab . . . saves months in new construction.

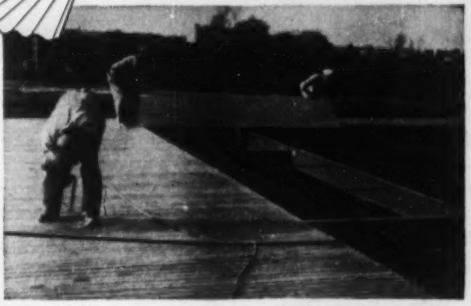
FLAT TOP ROOF DECK—rotary press formed

to insure uniform pattern. Wide cover width reduces handling and erection costs . . . fewer side laps cut welding time and offer greater support for concentrated loads. Ideal relationship between rib and flat provides maximum strength and cover per pound of steel. The characteristic pattern of Roof Deck precludes the use of "tough-temper" steel in forming but is manufactured from high-grade cold-rolled sheet steel. 35 sq. ft. covered per sheet placed.

CORRUFORM—light weight, permanent corrugated steel form

for concrete floors and roofs . . . stronger by far than conventional corrugated steel of same shape and weight . . . functions as a base for thin concrete slabs in steel joist floors and roofs . . . thinner, stronger slabs mean construction economy . . . concrete saving through lack of sag or leakage . . . speed and ease of placing Corruform also adds economy.

TUFCOR—Permanent, non-combustible roof construction



for light-weight, insulating concrete roofs—for spans up to 7 feet. To use Tufcor: (1) Weld hi-strength galvanized Tufcor sheets to steel frame of roof; (2) Place 2" or more, of concrete fill on steel shell of Tufcor; (3) Put a built-up roof over insulating concrete fill. Result: An economical roof, with an attractive underside, that will last the life of the building.

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Milcor Roof Deck offers cost-cutting advantages you can't afford to overlook:

1. It can be erected anytime — in any weather a man can work.
2. It is light in weight — finished roof requires less costly supporting structures.
3. It is versatile — can be used for flat, pitched, or curved roofs . . . sidewalks and partitions . . . or as permanent steel forms for concrete.

Milcor Steel Roof Deck provides additional advantages, also: High strength-to-weight ratio. Fire resistance. Low maintenance cost.

There are many durable, low-cost Milcor Roof Deck installations now in service throughout the country — on auditoriums, field houses, factories, office buildings, hotels, apartment houses, hospitals, and schools.

For help in using Milcor Steel Roof Deck efficiently, see the Milcor Manual. Write for your copy. And — call on our engineering service for assistance on your special problems.

Milcor Steel Roof Deck is quickly attached to any structural member by welding. Clips can be furnished for anchoring the deck, when welding facilities are not available or if purlins are wood.

Unique design permits sections to be nested and lapped quickly and easily. Plates interlock firmly, providing an unbroken roof surface that is adaptable to any degree of insulation.

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Design recommendations developed from these tests did not prove acceptable to British engineers, probably because of their complexity. Nevertheless, the findings reported in this book should be useful to steel designers here and abroad who wish to improve their concept of how structures actually behave.

Reports and pamphlets

ASTM STANDARDS ON CEMENT (WITH RELATED INFORMATION) — American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. $2.75.

WATER SUPPLY AND SEWAGE DISPOSAL—Technical Assistance Mission No. 46, Published by the Organization for European Economic Co-operation, 2002 P St. N. W., Washington 6, D. C. $2.00.

AMERICAN STANDARD BUILDING CODE REQUIREMENTS FOR MASONRY—National Bureau of Standards, Miscellaneous Publication 211, For sale by the Superintendent of Documents, Washington 25, D. C. $0.20.

MAKING DURABLE CONCRETE DRAIN TITLE ON PACKER-HEAD MACHINES—Station Bulletin 426, Agricultural Experiment Station, University of Minnesota, University Farm, St. Paul 6, Minn.

DRIVER CONTROL — Achieving Greater Traffic Safety Through Efficiency at the Wheel—The Eno Foundation for Highway Traffic Control, Saugatuck, Conn.

SEPTIC TANK SOIL ABSORPTION SYSTEMS FOR DWELLINGS—Construction Aid 5, Housing and Home Finance Agency. For sale by the Superintendent of Documents, Washington 25, D. C. $0.25.

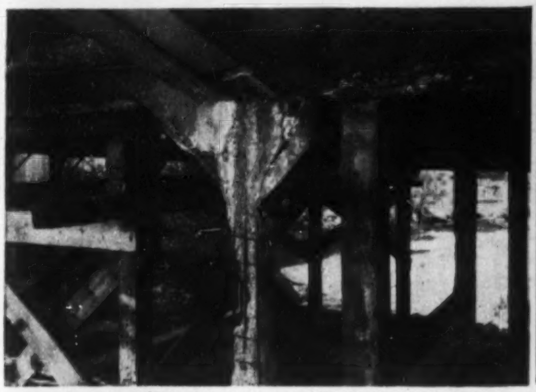
BUILDING BETTER FROM MODULAR DRAWINGS: The Modular Method in Building Construction—For sale by Superintendent of Documents, Washington 25, D. C. $0.20.

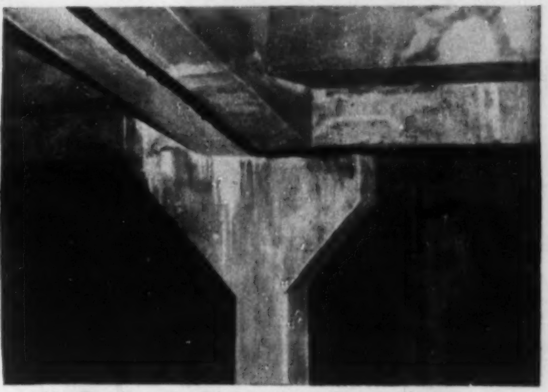
INSTRUMENTATION IN WATER, SEWAGE, AND WASTE TREATMENT—The Instruments Publishing Company, 845 Ridge Avenue, Pittsburgh 12, Penn. $2.00.

STATISTICAL THEORY OF EXTREME VALUES AND SOME PRACTICAL APPLICATIONS—National Bureau of Standards, Applied Mathematics Series 33. Superintendent of Documents, Washington 25, D. C. $0.20.

REPORTS OF THE DISCUSSIONS AT THE TECHNICAL SESSIONS — Third Annual Meeting of the Building Research Institute. Published by the Building Research Institute, 2101 Constitution Avenue, N. W., Washington 25, D. C. $2.00.

ERIE'S CONDEMNED VIADUCT RESTORED IN RECORD TIME WITH $75,000 SAVINGS


Concrete in Erie viaduct was crumbling and honeycombed.


After Prepakt repairs, Erie has stronger-than-new structure.

● The West 6th Street Viaduct had always been a "headache" for the city of Erie (Pa.). Soon after completion in 1925, it required shoring up. By 1952 rapid deterioration of concrete structural members caused it to be closed to traffic.

With cracked, honeycombed columns and a badly disintegrated deck, it was near collapse. Rebuilding, although costly, seemed the only solution until Intrusion-Prepakt suggested a rehabilitation plan using its fast, low-cost method.

Prepakt was awarded the contract and started work to meet a 100-day deadline. All porous, disintegrated concrete was removed by chipping. Then, members were restored to original size with Prepakt Concrete made by (1) forming members, (2) filling forms with coarse aggregate and (3) intruding this aggregate with special Intrusion mortar. Prepakt Concrete does not shrink during setting and has a very high permanent bond strength, making it ideal for repair work.

Consulting Engineer: Joseph G. Conrath

To make the bridge *stronger than new* (from H-12 to H-20), a new Prepakt Concrete girder beam was added on the longitudinal centerline. This beam and its columns are supported by cast-in-place Prepakt Concrete piles.

Erie's bridge was reopened *28 days ahead of schedule*—some five months earlier and $75,000 cheaper than with any other method.

Once again Prepakt lived up to its claim: "If it's still standing, we can repair it"!

A request on your company letterhead will bring full information on this and other Prepakt installations. Write the Main Office, Room 779-N, Union Commerce Bldg., Cleveland.

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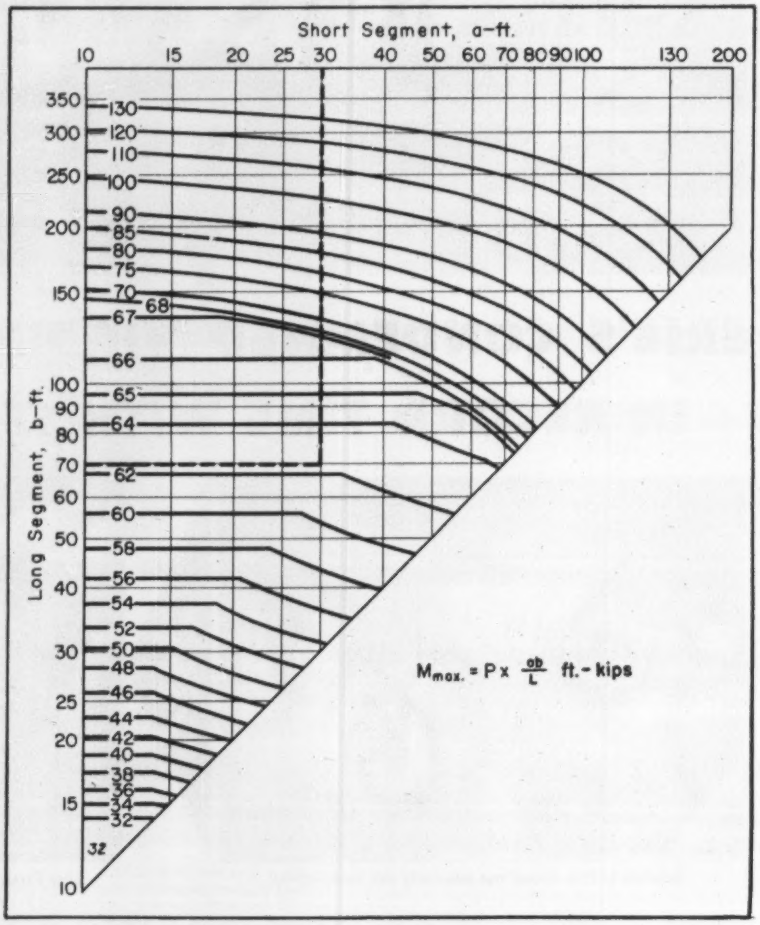


Chart eases moment calculations

The above chart was developed to facilitate computation of maximum live-load bending moment at any point on a simple-beam span of a bridge. It is based on H20-S16-44 loading of the American Association of State Highway Officials.

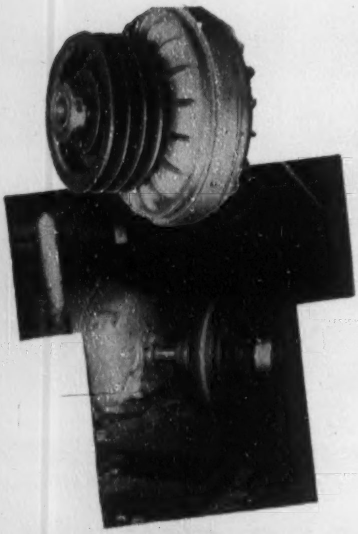
While maximum moments at the center of various spans are given in an appendix to the AASHO "Standard Specifications for Highway Bridges," maximum moments at other locations, though important in design, are not presented. This chart is intended to fill the gap.

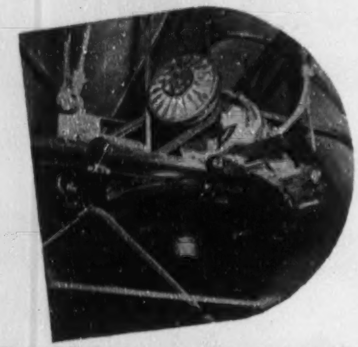
By means of the chart an equivalent concentrated load is obtained, from which the required bending moment can easily be computed. An equivalent concentrated load was used because it leads to small interpolation intervals and is quite accurate, even when used within the usual limitations of a small diagram.

To find the bending moment for a single-lane load, at a point that is at a distance of a feet from one end of a span and b feet from the other end, enter the chart horizontally at b and vertically at a. The intersection determines the equivalent load, P, in kips, which may be read by interpolating between the heavy-line curves. The required moment is found to be the product Pab/L, where L is equivalent to the span.

• **For example,** find the maximum moment in a 100-ft. span at a point 30 ft from one end. If you enter the chart at the left side with 70 ft and at the top with 30 ft, the intersection of the two ordinates falls between the curves marked 62 and 64 and may be interpolated to be 62.3. The required moment then is 62.3 × 30 × 70/100 = 1,310 ft-kips.—Gerald K. Gillan, Professor of Civil Engineering, Pennsylvania State University.

(*Continued on page* 322)





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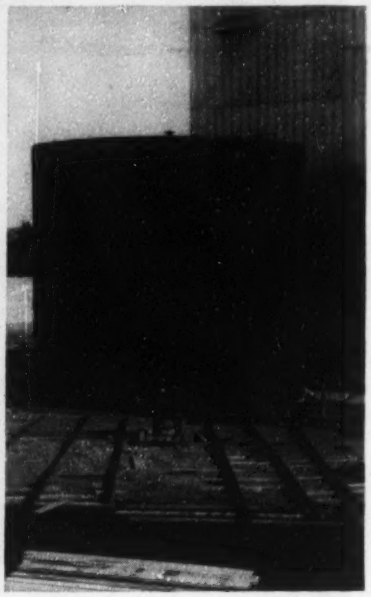
Greased rails relocate 50-ton tank

When the Maine Public Service Company at Caribou, Maine embarked on an expansion program, a 10,000-bbl oil storage tank was on the wrong side of the main line of double tracks of the Bangor & Aroostock Railroad.

Stone & Webster Engineering Corp., Engineers and Constructors were faced with three alternatives: they could scrap the 42-ft x 40 ft high tank and erect a new one; cut it up and reassemble it at the new site; or move the tank bodily.

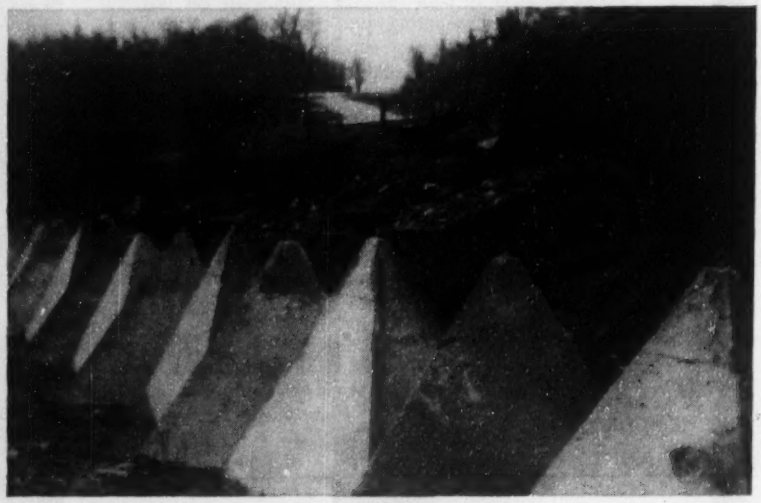
The last appeared to be the most desirable but the move involved not only crossing the tracks but moving the tank several hundred feet down the tracks and completing the work in a specified time to avoid interfering with railroad traffic.

During the week preceding the move, the 50-ton tank was jacked up at its original location, placed on wooden cribbing and skidded to a position adjacent to the tracks. Early one Sunday morning the tank was hauled onto the main line tracks with a winch truck. A coat of grease on the rails permitted the flat bottom of the tank to be skidded along the main line to a point opposite its new location.



Six parallel lines of rails on timber sleepers had been arranged in advance, roughly at right angles to the main line and leading to the sand cushion on which the tank would rest.

By late afternoon the railroad tracks had been washed free of grease after sanding as an extra precaution and the main line was open to traffic.



Pyramids form flexible retaining wall

Precast tetrahedra with 7-ft sides and containing 1½ yds of concrete have been used effectively to protect the toe of a road slope from the ravages of high water in a nearby creek. The pyramids were aligned in a row on 3½-ft centers and laced together with galvanized guy strand. The cost of installation is reportedly much less than that of a retaining wall. A further advantage is gained because it is felt that since the individual blocks are free to settle if undermined, the pyramid installation will withstand much less damage than would accrue to a wall. Truman P. Young, Hanly & Young, Engineers, 802 Gerke Bldg., Cincinnati 2, Ohio.

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OCTOBER 7, 1954

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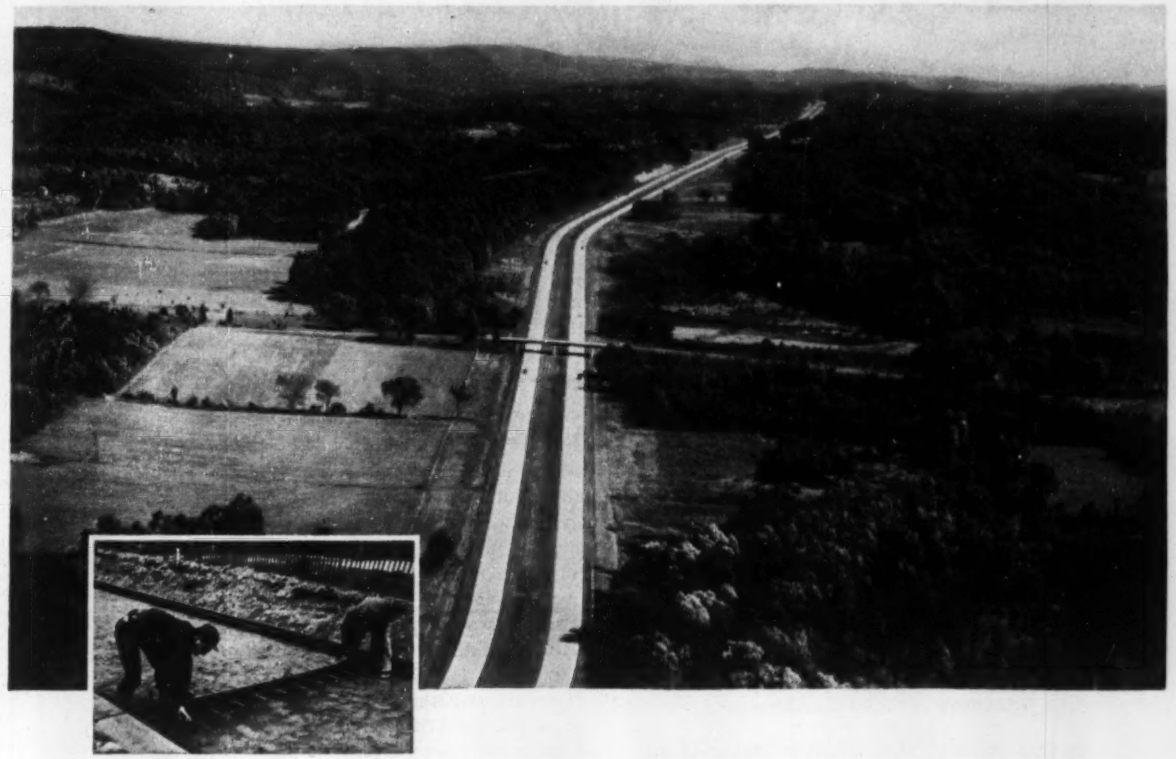
The New York State Thruway



FLEXCELL* JOINT FILLER ASSURES TIGHTER, SMOOTHER, MAINTENANCE-FREE EXPANSION JOINTS

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*Flexcell is a Trademark identifying Bituminous Fiber Expansion Joint Filler marketed by The Celotex Corporation.

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Without obligation, please send me complete data on Flexcell Bituminous Fiber Expansion Joint Filler.

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City________________________Zone____State________

The Reader ABC His Mark

THE ABC SYMBOL, which appears at the head of this page, is your brand—the reader's brand—on this magazine. It stands for Audit Bureau of Circulations. It means that this magazine will stay in business only so long as it continues to serve its readers to their satisfaction.

That Bureau—known for short as ABC—is a voluntary, nonprofit, cooperative association founded in 1914 by a group of publishers, advertisers and advertising agencies who wanted to establish and maintain higher standards of publishing practices than then prevailed. Its primary and specific purpose was to set up yardsticks to appraise circulation values and to verify the claims of publishers as to their circulations. For the buyer of advertising space this provides an effective means to take some of the guesswork out of buying and to reconcile the conflicting claims of competing publishers. BUSINESS WEEK magazine has aptly described ABC as "the publisher's conscience—and cop."

BUT IN DOING that job, ABC performs another function of high importance to the readers of ABC member publications. It provides a constant pressure on the publishers to keep alive in their staffs a sense of primary responsibility to their readers. That is because the most simple and direct method of making a publication responsible to its readers is to place upon it a purchase price, whether by subscription or newsstand purchase. The right to purchase or to refrain from purchasing a publication gives to the reader and to no one else the power to pass effective judgment on the publisher's success in serving the reading public. Each paid publication will grow or languish, will prosper or fail, in proportion as it wins or loses the following of thousands or millions of readers. The readers, by their patronage, record their judgments as to whether the publisher and his publication are measuring up to their responsibility to them.

And that is where the ABC comes into the reader's picture. The newspaper or magazine that carries the ABC symbol on its masthead must in the first place be a paid circulation publication. Moreover, it must conform to the high standards set up by the Bureau as to terms of payment and accounting methods. And again it must open all of its books to the auditors of the Bureau on demand.

SINCE THE INFORMATION thus determined by thorough and impartial audit is periodically made public through the ABC statements and audit reports, it is constantly available to and universally used by advertisers who are considering the purchase of space in an ABC publication. These reports show the circulation trend, as verified and certified by ABC, and thus put the advertisers in a position to know whether or not the publisher is rendering satisfactory service to his readers.

Thus the publisher who submits his publication to the supervision and discipline of ABC affirms in the strongest possible manner that he recognizes his primary obligation is to his readers and that he owes his standing to a voluntary demand by those readers. It follows that the editors of ABC publications must be exceptionally alert to the desires of their readers and responsive to their needs, since any decline in circulation will soon show up in the ABC statements and audit reports.

THAT IS WHY we describe the ABC symbol as the reader's brand. It shows that a publication must be primarily responsive to him and that he holds in his own hands its success or failure. And that ABC symbol is not only a constant reminder to him of that fact, but also an equally constant reminder to all concerned that the reader's willingness to pay for the ABC publication is the acid test of its value to him and to the advertiser.

McGraw-Hill Publishing Company, Inc.

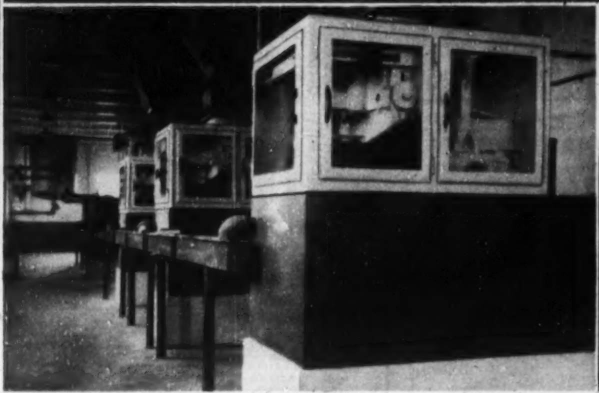
SAVANNAH, GA.

Cherokee Hill Filtration Plant

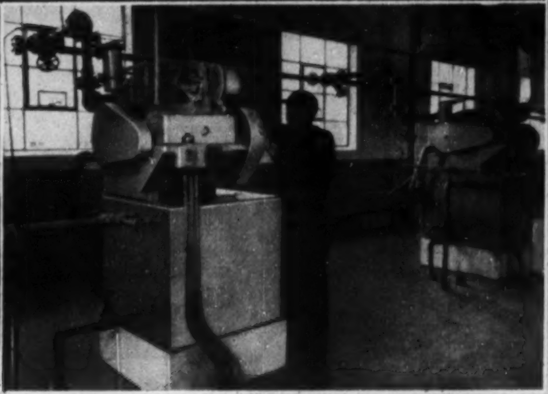
J. E. SIRRINE COMPANY

Engineers

GREENVILLE, SOUTH CAROLINA



Omega Model 44-20 Belt Gravimetric (weighing) Feeders for lime, carbon, soda ash — equipped with Rotary Bin Gates, Dust Collectors, Extension Hoppers, and automatic-proportional controls from Venturi influent meter.



Omega Rotodip Liquid Feeder for feeding alum solution in response to continuous pH meter — using pneumatic control system.

With the completion of this modern filtration plant, Savannah increased its total water supply capacity by forty million gallons per day. The plant is the product of good municipal planning combined with competent engineering assistance. It utilizes many design advancements which provide high-level performance at low operating cost.

As in many filtration plants in this area, considerable emphasis is placed on efficient chemical treatment. Omega Chemical Feeders, arranged for automatic-proportional control, are of great assistance to B. J. Sams, Supt., in maintaining a high-quality effluent under all seasonal conditions. For complete information on Omega Water Works Equipment supplied for the Cherokee Hill Filtration Plant, address Omega Machine Company, Providence 1, Rhode Island.

OMEGA *THE LAST WORD IN* **FEEDERS**

DIVISION OF B-I-F INDUSTRIES, INC.

BUILDERS IRON FOUNDRY • PROPORTIONEERS, INC. • BUILDERS-PROVIDENCE, INC.

BIF METERS FEEDERS CONTROLS

CONSTRUCTION REPORTS

Bids Asked—Low Bidders—Contracts Awarded—First Section—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager
J. A. MAHONEY, M. O. WETZEL, L. M. WINISKI, M. E. SCIORRA, F. S. DEMBEK, Reports.
J. H. WEBBER, M. R. ROESSLER, E. R. HUBER, Statistics.

NEW ENGLAND

BIDS ASKED—HEAVY CONSTRUCTION

▲ **N. H., Portsmouth**—TRANSMITTER AND RECEIVER BLDGS.—BA 10/15—U. S. Eng., 857 Commonwealth Ave., Boston, Mass., transmitter and receiver bldgs., plumbing, heating, ventilating, diesel fuel piping sys. and electric, Portsmouth Air Force Base, ENG-19-016-53-23. $100,000-$200,000. Plans deposit $10. CD 9/16.

BIDS ASKED—BUILDINGS

Mass., Leominster—SCHOOL—BA 10/14—City, Church St., 1 story elementary school, boiler room, Northwestern area. $480,000. Plans deposit $50 refundable, Baker & Dingman, 42 Main St., archts. CD 10/30/51.

SOON LETS CONTRACT—BUILDINGS

Mass., Boston—CHURCH—St. John of Damascus Church, 68 Hudson St., soon lets contract church, Museum Rd. (Fenway), $300,000, Samuel Homsey, 917 Gilpin Ave., Wilmington, Del., archt. Anderson & Beckwith, 11 Beacon St., Boston, assoc. archts. CD 9/9.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

† **A. Cefalo & Sons, Inc.**, 42 Bennett St., Lynn, Mass., LB **$334,600**, est. $250,000-$500,000, facilities at Fort Dearborn, Rye, ENG-19-016-55-13, FORT DEARBORN, N. H. U. S. Eng., 857 Commonwealth Ave., Boston, Mass. Edwin T. Steffian, 11 Beacon St., Boston, Mass., archt. **Bids Sept. 17.**

MASSACHUSETTS—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,

Worcester, Sand & Gravel Co., Inc., 214 Holden St., Shrewsbury, Mass. LB **$333,612**, est. $420,000. hy. reconstr., Barre-Oakham;

Charles Callahan Co., 50 Call St., Jamaica Plain, Mass. LB **$445,843**, est. $480,000. hy. reconstr. Rte. 9, Brookline;

Northeastern Constr. Co., 74 Swift Rd., Framingham, Mass. LB **$112,263**, est. $90,000. constr. driveways, parking area, Dpt. Maintenance and Traffic Depot, Wellesley. Bids Sept. 21. CD 9/2 and 9/8.

MASSACHUSETTS—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,

Campanella & Cardi Constr. Co., 780 Jefferson Blvd., Warwick, R. I. CA **$598,596**, est. $540,000. hy. and bridge reconstr. Mattapoisett Rd., Mill St. and Wareham Rd., Rte. 6, Marion. CD 9/20, under LB.

BUILDINGS

LOW BIDS AND CONTRACTS

Beck Constr. Co., Rangeway St., Waterville, Me. LB **$81,820**, est. $80,000. municipal GARAGE, Hardy St., BREWER, ME. City, R. E. Stewart, city mgr. City Hall, Brewer, Me. Bids Sept. 20. CD 9/9.

Louis Schoolnick Constr. Co., 49 Garden St., Hartford, Conn., CA, **$100,000**. WAREHOUSE and SHOWROOM, HARTFORD, CONN. Beacon Light & Supply Co., Allyn St., Hartford, Conn. Kane & Fairchild, 734 Asylum St., Hartford, Conn., archts.

G. S. Jones Co., 998 Farmington Ave., West Hartford, Conn., CA, **$84,000**, LAUNDRY and OFFICES, Laselle Rd. and Ellsworth St., WEST HARTFORD, CONN. New England Laundry, 455 Homestead Ave., Hartford, Conn. Bids Aug. 17. CD 8/2.

▲ **The Wadhams May Co.**, 15 Lewis St., Hartford, Conn., CA **$1,304,198**, HIGH SCHOOL, Church and Center Sts., WINDSOR LOCKS, CONN. Town, High School Bldg. Comn., 50 Church St., Windsor Locks, Conn. Bids Sept. 10. CD 9/16, under LB.

MIDDLE ATLANTIC

BIDS ASKED—HEAVY CONSTRUCTION

D. C., Wash.—STADIUM, ATHLETIC FIELD—BA 10/12—D. C. Govt., Director Bldgs. & Grounds, 499 Pa. Ave. N. W., Wash., D. C., stadium and athletic field at Coolidge Senior High School, 5 and Sheridan Sts. N. W. Plans deposit $25. CD 5/29/52, under Public Buildings.

† **New York**—BA 10/12—U. S. Eng., 80 Lafayette St., New York, Zone 13, dredging approx. 67,800 cu. yd. all material except ledge rock from Patchogue River, Great South Bay, Suffolk Co., Serial No. CIVENG-30-075-55-15.

N. J., Teterboro—RUNWAYS—BA 10/13—Port of New York Auth., 111 8th Ave., New York, Zone 11, N. Y. Contract TA 230.001, extending runways, Teterboro Airport. Plans deposit $30. CD 1/18.

New Jersey—LIGHTING—BA 10/14—New Jersey Hy. Auth., Cafeteria, State Hy. Dpt. Office Bldg., 1035 Parkway Ave., Trenton, Contract No. 194, Section 3, Garden State Parkway, access, exit and service road lighting from Park Ave. to Dodd St., City of East Orange, Essex Co. Plans deposit $10.

N. Y., Marcy—ELECTRIC CONNECTIONS—BA 10/14—Bureau Contracts & Accounts, The Governor Alfred E. Smith State Office Bldg., Albany, electric service connections, Marcy State Hospital. Plans deposit $20. CD 7/9/53, under Public Buildings.

N. Y., Orient—BATHHOUSE, etc.—BA 10/14—Long Island State Park Comn., Belmont Lake State Park, Babylon, restoration of bathhouse and facilities at Orient Beach State Park.

NEW JERSEY—BA 10/19—New Jersey Turnpike Auth., Administration Bldg., New Brunswick,

Contract No. N-7, fabrication, erection superstructure steelwork for viaducts for Ramp E, Ramps F and H and Ramp G and portion of Newark Bay-Hudson County Extension on viaduct all at Newark Airport Interchange of New Jersey Turnpike in City of Newark, Essex Co. Plans deposit $15. Howard, Needles, Tammen & Bergendoff, 55 Liberty St., New York 5, N. Y., consult. engrs. CD 8/20/53, under Streets and Roads.

New York—TUNNEL APPROACH—BA 10/26—At Office Chief Engineer of The Port of New York Auth., 111 8th Ave., New York, Zone 11, Contr. LT-160.019, constr. approach roadway sys. in Manhattan for the Lincoln Tunnel, incl. the Third Tube, from south side of 34 St. to southeast corner Dyer Ave. and 39 St., Sect. No. 1. Plans deposit $100. CD 1/18.

N. Y., Farmingdale—BA 10/28—Bureau Contracts & Accounts, The Governor Alfred E. Smith State Office Bldg., Albany, sanitary work (replacement of sewage disposal plant) Long Island Agricultural & Technical Institute. Plans deposit $30. CD 9/27/46, under Public Buildings.

BIDS ASKED—BUILDINGS

N. Y., Green Haven—BUILDING—BA 10/14—Bureau Contracts & Accounts, The Governor Alfred E. Smith State Office Bldg., Albany, second story addn. to Industrial shop bldg., Green Haven Prison. Plans deposit $20.

N. Y., New York—HOUSING—BA 10/19—New York City Housing Auth., 299 Broadway, Zone 7, foundations and general constr., heating and ventilating, electric, plumbing, furnishing and installing elevators for Forest Houses, Proj. No. NYS-57, Sect II, incl. Buildings Nos. 8 to 15 (inclusive) and the gymnasium of Bldg. No. 10, in area bounded generally by E. 164 St., Jackson Ave., E. 165 St., Tinton Ave., E. 163 St. and Trinity Ave. Plans deposit $75. $25 elevators. CD 6/2/51.

▲ **N. Y., Springfield**—HIGH SCHOOL—BA 10/21—Bd. Educ., Bureau Constr., 42-15 Crescent St., Long Island City, Zone 1, general constr., plumbing and drainage, heating and ventilating, electrical and lighting fixtures for new Junior High School 59, Ridgedale, Grayson and Lucas Sts., Queens Boro, E-665. $2,814,750. Plans deposit $32, general constr., $10 each mech.

N. Y., New York—SCHOOL—BA 10/22—Director Bureau Constr., 42-15 Crescent St., Long Island City, Zone 1, modernization, general constr. P. S. 33, Jerome Ave. and 184 St., The Bronx. Plans deposit $12.

▲ **New York**—SCHOOL—BA 10/26—Bd. Educ., Bureau Constr., 42-15 Crescent St., Long Island City, Zone 1, general constr., plumbing and drainage, heating and ventilating, electrical and lighting fixtures for new P. S. 220, Yellow Stone Blvd. and 62nd Rd., Queens Boro. $1,737,500. Plans deposit $24 general constr., $10 each mech.

▲ **N. Y., Brooklyn**—HIGH SCHOOL—BA 10/29—Bd. Educ., Bureau Constr., 42-15 Crescent St., Long Island City, Zone 1, general constr. Junior High School 166, Van Sicklen Ave. and Linden Blvd. $2,141,300. Plans deposit $36. CD 5/13.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

▲ **NEW YORK**—Triborough Bridge & Tunnel Auth., Admin. Bldg., Randall's Island, New York, Zone 35,

Tully & DiNapoli, Inc., 127-50 Northern Blvd., Corona, N. Y., CA **$2,799,270**, grade separation structure, Contr. HE-1, Horace Harding Expressway at Queens Blvd., Queens Co. Bids Sept. 1. CD 9/7, under LB.

New York—Triborough Bridge & Tunnel Auth., Admin. Bldg., Randall's Island, New York, Zone 5,

Queens Structure Corp., 32-57 57th St., Woodside, N. Y. CA **$411,760**, grading, paving, misc. work South Conduit Ave. (Southern Parkway) from Aqueduct to Laurelton Parkway, Queens Boro, Contr. SP-1. Bids July 21. CD 7/1.

▲ **NEW YORK**—Triborough Bridge & Tunnel Auth., Admin. Bldg., Randall's Island, New York, Zone 35,

Nassau Mascali Contr. Corp., 69-34 51 Ave., Woodside, N. Y., CA **$1,362,968**, grading, drainage, paving, utilities from Cross Bay Blvd., Contr. No. CB-1, Conduit Blvd. Queens Co. Bids Aug. 25. CD 8/30, under LB.

▲ **Zara Contg. Co.**, Engel St., Hicksville, N. Y. CA **$1,632,100**, sewerage sys. to serve Roosevelt Field-Carle Place Industrial area, incl, 60,000 ft. lateral sewer lines and 22,000 ft. trunk sewers, Carle Place, MINEOLA, N. Y. Bd. Supervs. Nassau Co., Old County Court House, Mineola, N. Y. Bids Aug. 24. CD 8/27, under LB.

NEW JERSEY—New Jersey Hy. Auth., State Hy. Dpt. Office Bldg., 1035 Parkway Ave., Trenton,

Edward O. Wickberg, 39 State St., Perth Amboy, N. J. LB, **$109,777**, repair of fire damage to Raritan River and Edison Bridges, Garden State Parkway, Contract No. 184, Middlesex Co. Bids Sept. 20. CD 8/31.

NEW JERSEY—New Jersey Hy. Auth., State Hy. Office Bldg., 1035 Parkway Ave., Trenton,

Gordon Constr. Co., 1436 E. Elizabeth Ave., Linden, N. J., LB, **$137,871**, installation 6.9 mi. guard rail Garden State Parkway from Hazel St. Clifton to Route 17, Paramus, Contract No. 129, Bergen and Passaic Counties. Bids Sept. 16. CD 8/31.

NEW JERSEY—New Jersey Hy. Auth., State Hy. Office Bldg., 1035 Parkway Ave., Trenton,

South Jersey Constr. Co., 207 Adams St., Riverside, N. J., CA, **$805,938**, drainage, paving Garden State Parkway, Contract No. 170 service areas at Cheesquake, Manasquan, Forked River, Absecon and Seaville, Middlesex, Monmouth, Ocean, Atlantic and Cape May Counties. Bids Aug. 1, awarded Sept. 16. CD 8/30, under LB.

▲ **PENNSYLVANIA**—Pennsylvania Turnpike Comn., 11 N. 4th St., Harrisburg,

Lane Constr. Corp., 37 Colony St., Meriden, Conn., LB **$5,948,649**, constr. 4.195 mi. Sect. 36-B of Northeastern Exten. of Turnpike, North and South Whitehall Twps.; constr. 5.01 mi. Sect. 36-C, of Northeastern Exten. of Turnpike, Washington Twp., both Lehigh Co. Bids Sept. 23. CD 8/31.

SOUTH

BIDS ASKED—HEAVY CONSTRUCTION

† **Alabama**—BA 10/14—U. S. Eng., P.O. Box 1169, 2301 Grant St., Mobile, Zone 7, access road and excavating for the Warrior Lock and Dam Warrior River, vicinity of Eutaw and Greensboro. CD 8/25.

KENTUCKY—BA 10/14—Commonwealth of Ky., Dpt. Hys., Frankfort,

Bullitt Co.—Contr. 8 consists of two 24 ft. lanes c. conc. pavement approx. 12.6 mi. in Design Sect. B of Kentucky Turnpike Proj. No. 1 beginning at Turnpike Centerline Station 725 plus 00 and generally northwardly to Turnpike Centerline Station 1390 plus

(Continued on page 331)

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $34,000; other public works $60,000; industrial buildings $82,000; other buildings $300,000. Also Foreign projects of $100,000 and more in size of interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England
Middle Atlantic
South
Middle West
West of Mississippi
Far West

PROPOSED WORK
Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.

BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.

LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a suuplementary contract award report will be published.

CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.

CD dates shown are of Construction Daily issue in which last previous report was published.

Symbols and Abbreviations Include:

†	Federal Government
▲	Project of $1,000,000 or over.
ENR	Engineering News-Record
CD	Construction Daily

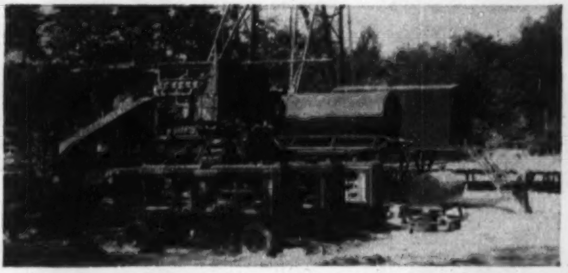
For additional reports see Construction Daily.

What makes SCHRAMM Compressors So Economical *

SCHRAMM Unistage Air Compressors have low maintenance and long life . . . resulting in savings to you . . . because:

1. Schramm mechanically operated poppet-type intake valves last as long as the compressor.
2. Schramm multiple cylinder construction means less work for each discharge valve.
3. Schramm engines are operated at the speed for which they are designed and not overspeeded to 1800 r.p.m.

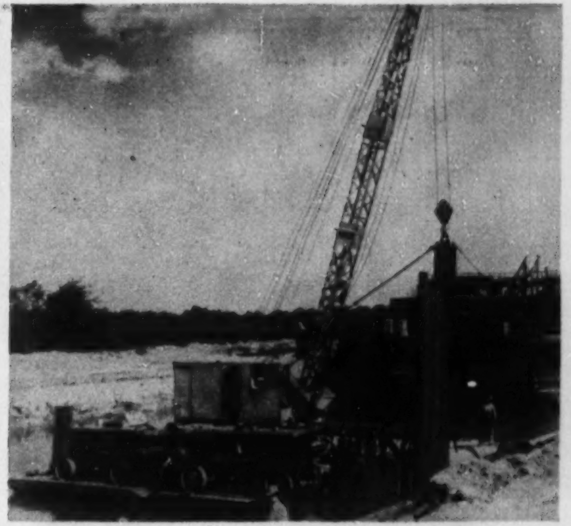
Records of Schramm users prove this!



3 Unistage 600 Schramms replaced rotary compressors on gas well and drilling job because of the ability of the Schramms to produce air at high pressures for dewatering and breaking stoppages.

Schramm air compressors are preferred for Guniting—because of the constant pressure (freedom from variation) and ability to operate any desired pressure for long periods without maintenance.

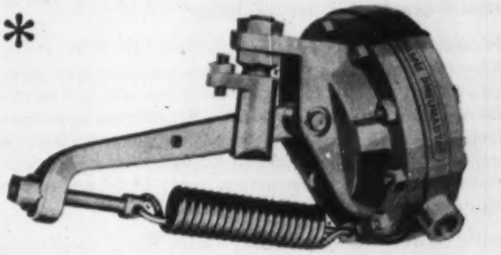
Schramm compressors replace rotaries on sand blast jobs because of their ability to operate continuously at 125 p.s.i.



Two Unistage Schramm 315 compressors operating as a unit (630 cfm) furnishing air for pile driving. When not used for pile driving, compressors are available for separate jobs. Pneumastat* controlled Schramms can be operated as a battery without special arrangement and each unit will carry its share of the load.

Schramm Unistage 600 is ideal for operating two wagon drills. The Pneumastat* controls air delivery to exact requirements of tools used.

*



*PNEUMASTAT: A patented Schramm instrument that regulates the production of compressed air according to the demand.

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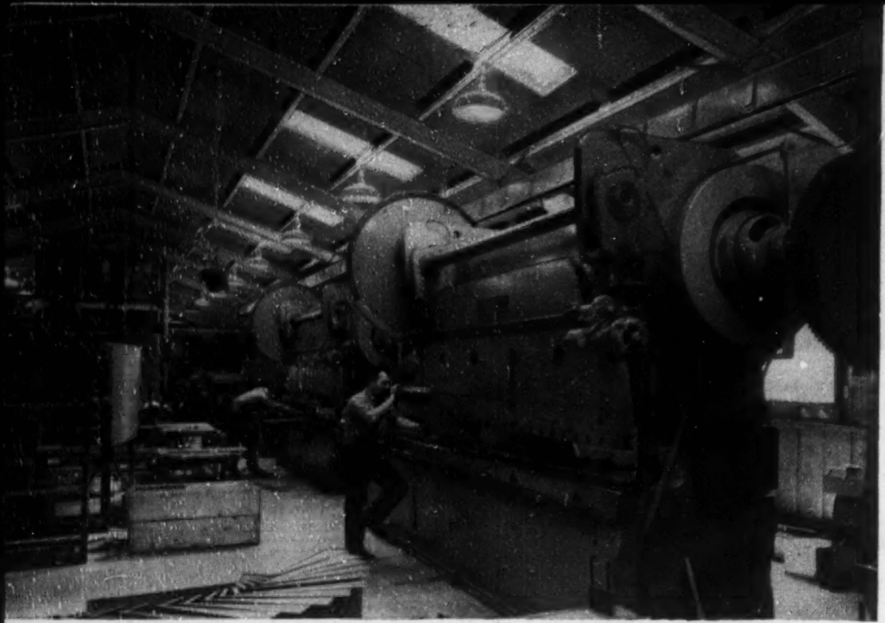


Battery of press brakes in the complete new plant of Lake Shore Electric, Inc., Bedford, Ohio. Butler steel buildings were used throughout . . . saved half the cost of new construction . . . gave Lake Shore a more efficient, better lighted, safer plant.

Buildings too *work harder, earn more*— when they're BUTLER steel buildings

Take a look at the performance of the new Butler-built plant erected for the Lake Shore Electric, Inc., Bedford, Ohio. They formerly occupied 30,000 square feet in a 4-story building—then "expanded" to a 1-story 23,300 square foot rigid-frame Butler steel building.

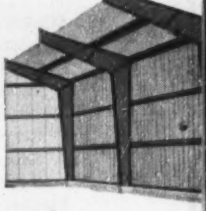
Production increased! Here is how Mr. S. W. Soos, President of Lake Shore Electric, explains it, "There is less waste motion now that everything here is on one floor. Post-free Butler construction also lets us place machines and materials for the most efficient work flow. Employees appreciate the soft, natural lighting from the Lite*Panls, and overall efficiency is improved by the convenience of our new layout. Yet square foot cost was considerably less than the cost of many common types of construction—only $6.00 per square foot *including* insulation, lighting and even overhead cranes."

Build better—for less money—with Butler steel buildings. They give you every advantage of conventional construction *plus* these profit-producing extras: (1) Your capital investment is lower, (2) Faster erection time puts you in production earlier, (3) steel or aluminum sheeting lowers maintenance costs, (4) pre-engineered Butler buildings do not become obsolete—you can profitably expand, alter or relocate them at any time to meet new demands of our fast-changing economy. Write today for full particulars about Butler buildings and the name of your nearest Butler dealer.

Here is why BUTLER is a better buy

Every Foot of Floor Space is Usable

There are no interior posts or columns to waste space and create work-slowing "bottlenecks." Rigid-frame construction also shrinks maintenance costs . . . extends building life.



Fast Erection . . . Easy Expansion

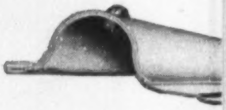
Precision-punched and dimensioned bolt holes speed erection—simplify expansion or dismantling and moving. Galvanized bolts, with Neoprene rubber washers, lock deep-corrugated sheets firmly to the sturdy frame.

Weatherproof Protection

The one-piece, die-formed roof ridge eliminates ridge roll—helps to make the building leakproof and weather-tight.

Triple-Strength Corrugated Sheets

Butler sheeting, with deep-drawn corrugations formed on 12-inch centers, is three times as strong as ordinary corrugated sheets. Overlapping corrugations bolt tightly together for maximum strength and weather protection. Available in steel or aluminum.



Attractive Curved Eaves

The neat, die-formed eaves—which bolt to the roof sheets—add to the appearance of Butler steel buildings . . . increase the strength of the eaves . . . help insure weather-tightness.

Weather-sealed Windows and Base

Where corrugated sheets meet windows or the foundation, they are tightly crimped for a snug fit that keeps out snow, moisture and rodents.

BUTLER®

BUTLER MANUFACTURING COMPANY

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918 Sixth Avenue, S. E., Minneapolis 14, Minnesota
1028 Avenue W, Ensley, Birmingham 8, Alabama
Dept. 18, Richmond, California

Manufacturers of Oil Equipment • Steel Buildings • Farm Equipment • Dry Cleaners Equipment • Special Products
Factories located at Kansas City, Mo. • Galesburg, Ill. • Richmond, Calif. • Houston, Texas • Birmingham, Ala. • Minneapolis, Minn.
(Union Tank & Supply Co.)

(Continued from page 328)

53.89. Plans deposit $5. Tecon-Berger Assoc., Lee Terminal Bldg., Standiford Field, Louisville, Zone 13, consult engrs., Howard, Needles, Tammen & Bergendoff, 7000 Crittendon Dr., Louisville, general consultant. CD 5/3/54.

Ga., Savannah—BA 10/26—Chatham Co., Court House, 9.781 mi. grading, paving, bridges Savannah Beach Road, U. S. Route 80, beginning at intersection of President St. and Liberty St., in Savannah and extending eastward to point north of Bull River on present Savannah Beach Road, incl. spur from a point on Oatland Island to present Savannah Beach Road on Whitemarsh Island. Plans deposit $5; adv. ENR 10/7.

† **S. C., Sumter**—HEADQUARTERS ADMIN. BLDG.—BA About 10/29—U. S. Eng., Customhouse, Charleston, Air Force headquarters admin. bldg., Shaw Air Force Base, No. 38-081-55-5. CD 9/25/51.

BIDS ASKED—BUILDINGS

† **W. Va., Clarksburg**—BUILDINGS—BA 10/12—Dist. P. Wks. Office, Fifth Naval Dist., U. S. Naval Base, Norfolk, Va., buildings alterations, Marine Corps Reserve Training Center, NOY 84419, Spec. 42764. Plans deposit $10.

N. C., Raleigh—MALE WING, etc.—BA 10/19—State Hospitals Bd. Control, Office, R. P. Pierce, bus. mgr., Capitol Bldg., alterations, renovations to Male Wing Wards Nos. 28, 29, 30 and 31. Plans deposit $50 general constr. $35 mech. Extended date. Allen J. Maxwell, Jr., Borden Bldg., Goldsboro, N. C., engr. CD 9/22.

† **Va., Fort Belvoir**—BARRACKS—BA 10/26—U. S. Eng., First and Douglas Sts. N.W., Wash. 25, D. C. two 500-man barracks, ENG-49-080-55-16-(14). Plans deposit $50. CD 9/21.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

VIRGINIA—State Hy. Dpt., Central Hy. Office Bldg., 1221 E. Broad St., Richmond,

E. F. Blankenship Co., 1308 W. Main St., Salem, Va., LB **$132,601**, Proj. II, constr. bridge, Rte. 58, State 1741-09-14-18, B.P.R. F 401 (16), Halifax Co.; LB **$96,991**, overpass and approaches over Virginian R. R. in Victoria, Rte. 40 and 49, State 3455-05-06, B.P.R. SG-529 (6), Lunenburg Co.;

McDowall & Wood, 1308 W. Main St., Salem, Va., LB **$101,086**, 330 ft. bridge over Holston River near Abington, Rte. 58, State 1795-11, B.P.R. F-594 (3), Washington Co.;

cancelled bids to have been opened Sept. 22, repairs to Cypress Creek Bridge, Rte. 258 at Smithfield, State Sec. 0140, Isle of Wight Co. Bids Sept. 22. CD 9/8.

VIRGINIA—State Hy. Dpt., Central Hy. Office Bldg., 1221 E. Broad St., Richmond,

Adams Constr. Co., 2725 Roanoke Ave., Roanoke, Va. LB **$72,479**, soil aggregate base, bit. surf. tr. 3.62 mi. Rte. 640, State 1395-07, B.P.R. S-779 (1), Washington Co.;

Mount Airy Grading Co., Box 9, Mount Airy, N. C., LB **$230,341**, Proj. I, grading, aggregate 2.72 mi. Rte. 58, State 1741-09-14-18, B.P.R. F-401 (16), Halifax Co.;

N. W. Moyer, Staunton, Va., LB **$93,324**, soil aggregate, bit. surf. tr. 5.24 mi. Rte. 634, State 1309-11, B.P.R. S-804 (1), Bedford Co.;

A. B. Torrence & Co., Inc., P. O. Box 217, Elkton, Va. LB **$88,264**, soil aggregate base, bit. surf. tr. 0.6 mi. Rte. 501, State 2009-05, B.P.R. S-643 (5), Bedford Co.;

W. W. Tuck & Son, Virgilina, Va., LB **$274,791**, b. conc. 2.808 mi. Rte. 460, State 1909-12, B.P.R. F-315 (16), Bedford Co.;

Virginia Eng. Co., Inc., 80 29th St., Newport News, Va. LB **$139,947**, b. conc. 2.668 mi. Rte. 17, State 2036-08. B.P.R. F-310 (4), Gloucester Co.;

D. W. Winkleman Carolina Co., P. O. Box 2566, Greensboro, N. C., LB **$76,842**, soil cement base, bit. surf. tr. 5.895 mi. Rte. 610, 677, 611. State 1342-09, B.P.R. S-843 (1), Hanover Co. Bids Sept. 22. CD 9/8.

▲ **MISSISSIPPI**—State Hy. Dpt., T. C. Robbins, dir., Jackson,

Evans Contg. Co., Quitman, Miss. CA **$187,138**, est. $185,000. grade, drain, culverts 5.609 mi. Miss. Hy. No. 20 between Junction with Miss. Hy. No. 13 and Magee, Proj. F 013-2 (9), Simpson Co.;

Newsom Bros., Columbia, Miss. CA **$85,359**, est. $86,000. grade, bridges, grav. surf. course 1.079 mi. Miss. Hy. No. 22 between Flora and Bolton, Proj. SP 22-3 (1), Madison Co.;

Boyd Constr. Co., Grenada, Miss. CA **$382,145**, est. $385,000. grade, drain, culverts, bridges 6.706 mi. Miss. Hy. No. 30 between Burtons and Tishomingo, Proj. F 044-2 (3), Prentiss and Tishomingo Counties;

R. B. Tyler Co., 1446 Levering St., Louisville, Ky. CA **$185,528**, est. $195,000. grade, drain, culverts, 5.361 mi. Miss. Hy. No. 24 between Woodville and Fort Adams, Proj. S 0153 (1) A, Wilkinson Co.;

O. J. Stanton & Co., Greenwood, Miss. CA **$282,622**, est. $280,000. grade, bridges, temporary grav. surf. course 11.007 mi. Miss. Hy. No. 32 between Oakland and Water Valley, Proj. S 0790 (4), A, Yalobusha Co.;

Worsham Bros., Corinth, Miss. CA **$227,866**, est. $230,000. base, double bit. surf. tr. 6.854 mi. Miss. Hy. No. 363 between Kirkville and Hobs Junction, Proj. S 0805 (1)A, Prentiss Co.;

Raley Contg. Co., Aberdeen, Miss. CA **$141,900**, est. $143,000. grade, drain, culverts 6.571 mi. Miss. Hy. No. 23 between Tremont and Red Bay, Ala., Proj. S 0806-(4)A, Itawamba Co.;

Talbert & Brown, Inc., 19 22 Ave. S., Meridian, Miss. CA **$245,080**, est. $245,000. base, double bit. surf. tr. 6.725 mi. Miss. Hy. No. 471 between Morton and Leesburg, Proj. SP 481-5474 (1), Scott Co. Grand total $1,737,638. Bids Sept. 21. CD 9/10.

BUILDINGS

LOW BIDS AND CONTRACTS

† **Southern Commercial Constr. Co.**, 1341 Pennsylvania Ave. S.E., Wash. D. C., LB **$168,540**. three WARE-

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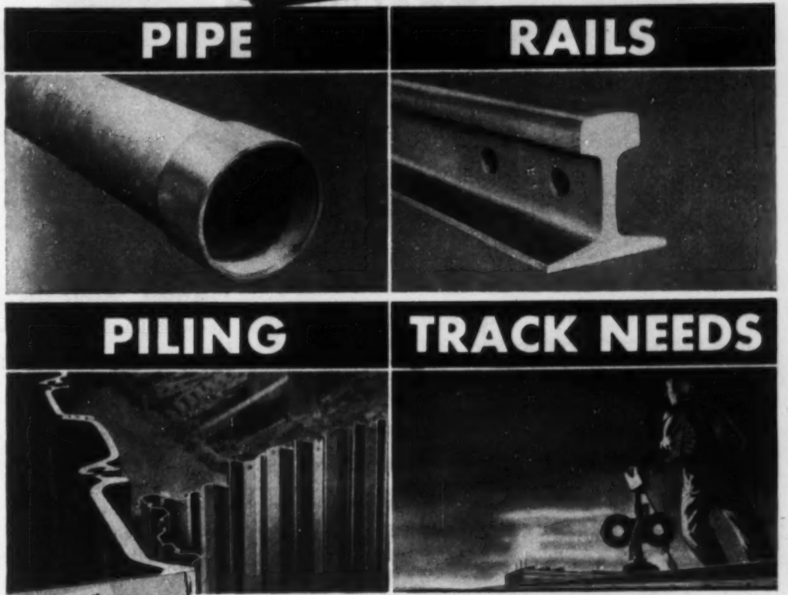

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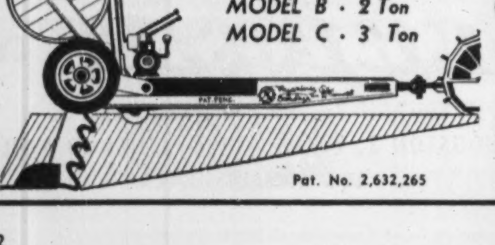

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HOUSES, FORT BELVOIR, VA. U. S. Eng., 1st and Douglas Sts. N.W., Wash. 25, D. C. Bids Sept. 21. CD 8/27.

J. **Kennon Perrin**, 6000 W. Broad St., Richmond, Va., CA **$864,336**. HERMITAGE BLDGS. Nos. 4 and 5 addns., sidewalks and parking lot, RICHMOND, VA. Virginia Methodist Home for The Aged, 1600 Westwood Ave., Richmond, Va. Bids Sept. 17, awarded Sept. 21. CD 9/23, under LB.

MIDDLE WEST

BIDS ASKED—HEAVY CONSTRUCTION

INDIANA—BA 10/20—Indiana Toll Road Comn., Dr. Dillon Geiger, chn., 309 W. Washington St., Old Trails Bldg., Indianapolis, Zone 4,

Contract C-26, grading, drainage, structures, paving approx. 3.5 mi. in Construction Section C-26 Indiana East-West Toll Road beginning at point about 5,122 ft. east of Sycamore Road at Toll Road Centerline, Station 3851 plus 10 in St. Joseph Co. and extending eastwardly to point about 2,062 ft. west of Mayflower Road at Toll Road Centerline Station 4035 plus 00 in St. Joseph Co.

Contract C-27, grading, drainage, structures, paving approx. 3.4 mi. in Construction Section C-27 of Indiana East-West Toll Road beginning at a point about 2,602 ft. west of Mayflower Road at Toll Road Centerline Station 4035 plus 00 in St. Joseph Co. and extending eastwardly to point about 75 ft. west of western edge of St. Joseph River at Toll Road Centerline Station 4213 plus 43.5 in St. Joseph Co. Plans deposit $5 for standard specification for Indiana-East-West Toll Road; $25 for plans, special provisions and proposal forms, per set, per construction section. CD 2/10.

BIDS ASKED—BUILDINGS

† **Ind., Fort Benjamin Harrison**—SCHOOL—BA 10/12—U. S. Eng., 475 Merchandise Mart, Chicago 54, Ill., combined adjutant general's school and finance school, ENG-11-032-55-4. Extended date. CD 9/13.

Ill., **Chicago**—BUILDING ALTERATIONS—BA 10/14—Illinois State Div. Architecture & Eng., State Capitol, Springfield, day rooms in Buildings CW 20 and CW 24, alterations, Chicago State Hospital. CD 4/9/45.

O., **Dayton**—EMPLOYEES—BA 10/19—State Dpt. P. Wks., State Office Bldg., S. Front St., Columbus, employees bldg. Dayton State Hospital. $420,000. Plans deposit $5. CD 12/17/52.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

William F. **Swetnam Constr. Co.**, Edmore, Mich. CA Approx. **$170,000.** 10 in. gas supply line and 10 mi. smaller lines along streets to extend service to North Linden community, Columbus, Franklin Co., OHIO. Ohio Fuel Gas Co., 99 N. Front St., Columbus, O.

N. **Ransohoff, Inc.**, 5th and Ford Blvd., Hamilton, O. CA Approx. **$60,000.** 30x60 ft. swimming pool for "Girls Town", on N. Bend Rd., CINCINNATI, O. Convent of The Good Shepherd, North Bend Rd., Cincinnati, O. Awarded Sept. 20.

† **Century Sprinkler Co.**, H. C. Siebold, 1401 Roseneath Ave., Richmond, Va., CA, **$117,828**, installing sprinkler system Veterans Administration Hospital, Proj. 12-5195, DOWNEY, ILL. Veterans Admin., Munitions Bldg., Wash. 25, D. C. Bids Sept. 21. CD 8/12.

BUILDINGS

LOW BIDS AND CONTRACTS

Indianapolis Homes, Inc., 3725 North Wallace St., Indianapolis 1, Ind. Owner Builds. **$540,000.** 30 HOMES in Eastridge Sixth Division of Lesley Ave. and E. 13 St., INDIANAPOLIS, IND.

Ferro Concrete Constr. Co., 203 W. Third St., Cincinnati, O., CA Approx. **$300,000.** doctors' and dentists' OFFICE BLDG., 2332 Auburn Ave., CINCINNATI, O. Medical Arts Building Corp., c/o Wm. Geoghegan, 1st. Natl. Bank Bldg., Cincinnati, O. Bids Sept. 8, awarded Sept. 16. CD 9/8.

Sever-Williams Co., Washington Court House, O., CA **$439,600**, general constr. stone, brick, glass SCHOOL BLDG. at Columbus State School for Mentally Retarded, COLUMBUS, O. State Dpt. P. Wks., State Office Bldg., S. Front St., Columbus, O. Bids Aug. 27. CD 8/16.

▲ **First Dayton Builders Corp.**, c/o Fred K. Johnson & Carter C. Willsey, Rte. No. 12, Box 23X, Dayton, O. Owner Builds. **$1,500,000.** 131 HOMES, 93-acre site east side Wolf Rd., running north to Haney Rd. in Harrison Twp., northwest of DAYTON, O.

J. H. **Butt Co.**, Chillicothe, O., CA Approx. **$300,000.** SUPERMARKET, WAVERLY, O. Hansel Butler, Waverly, O. Big Bear Stores Co., 1451 Goodale Blvd., Columbus, O., lessee.

WEST OF MISSISSIPPI

BIDS ASKED—HEAVY CONSTRUCTION

† **Ark., Jacksonville**—GRADING, DRAINAGE, etc.—BA 10/14—U. S. Eng., P. O. Box 867, Little Rock, grading, drainage, Lot IV, Little Rock Air Force Base, ENG-03-050-55-34. CD 12/17/52.

† **South Dakota**—BA 10/21—U. S. Eng., 1709 Jackson St., Omaha, Neb., constr. and relocation various buildings, Fort Randall Reservoir Proj., near Fort Thompson. Inv. 25-066-55-47. OD 5/25/44.

† **South Dakota**—CONTROL BOARD, etc.—BA 11/9—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver 2, Colo., Schedule 1, Item 1, one 230-kilovolt control board; Item 2, one complete set of unmounted carrier-current control and auxiliary relays and accessories, for Watertown and Granite

(Continued on page 334)

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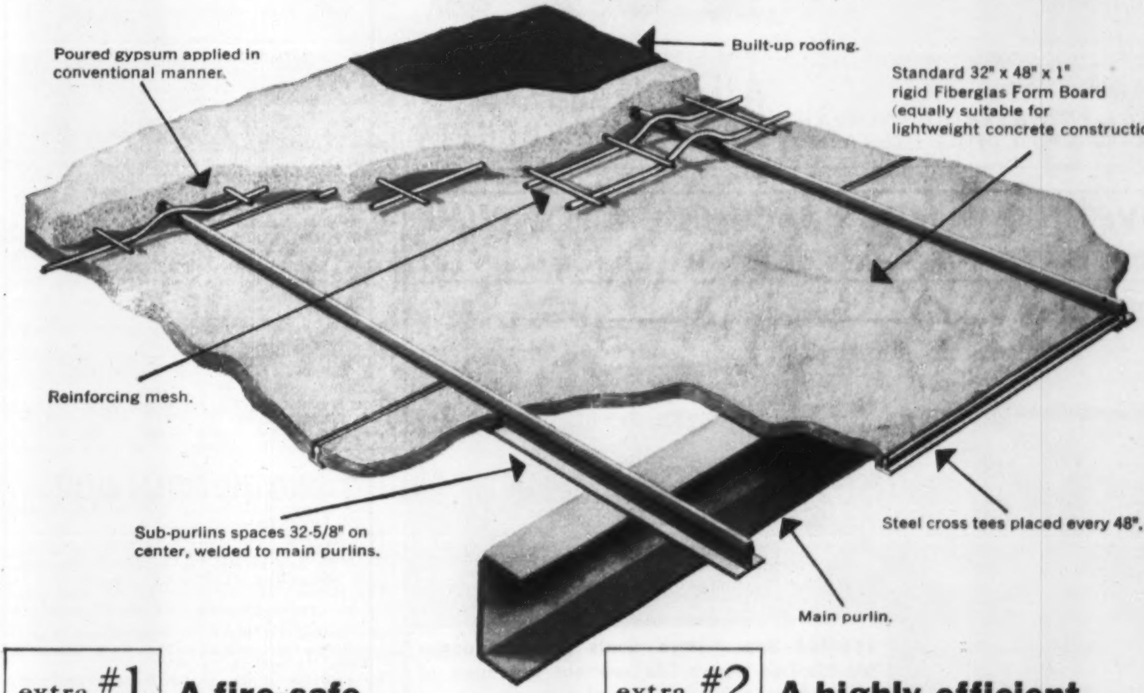
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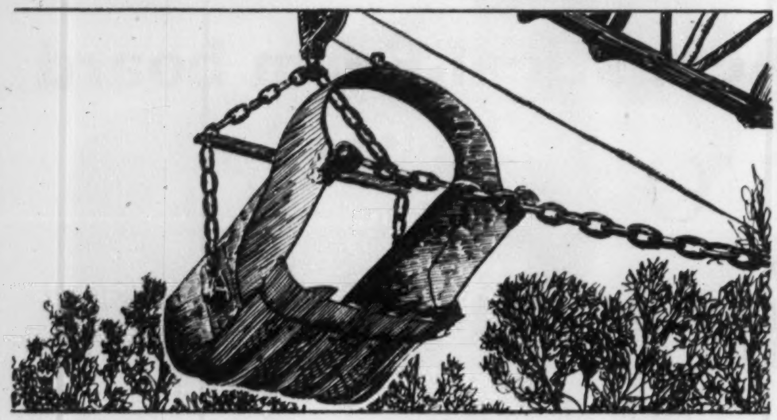

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(Continued from page 332)

Falls Substations, Transmission Div., Missouri River Basin Proj. Inv. No. 4257.

BIDS ASKED—BUILDINGS

† **Kan., Fort Riley**—BARRACKS—BA On Or About 10/25—U. S. Eng., 601 Davidson Bldg., Kansas City 8, Mo., barracks, roads, ENG-23-028-55-17. CD 7/2/51.

† **Colo., Camp Carson**—DORMITORIES—BA On Or About 10/26—U. S. Eng., 1709 Jackson St., Omaha 2, Neb., 6 E. M. dormitories, near Colorado Springs, Inv. No. ENG-25-066-55-28.

† **Tex., El Paso**—BARRACKS—BA About 10/26—U. S. Eng., P.O. Box 1538, Albuquerque, N. M., 37 one story H-shaped masonry barracks, two main wings approx. 24x110 ft. each connecting wing approx. 24x40 ft. at Fort Bliss; one rein.-con. and masonry EM barrack, 1 story, 60x67 ft. equipment room, barracks part is 3 story approx. 40x260 ft., William Beaumont Army Hospital; utilities incl. sewer, water, gas, electrical work; asph. paving and sidewalks. Serial No. ENG-29-005-55-32. CD 7/6/51.

SOON LETS CONTRACT—BUILDINGS

Mo., Ferguson (St. Louis 21 P.O.)—CHAPEL and SCHOOL—St. Sebastian Catholic Parish, Rev. Thomas J. Winkelmann, pastor, Chambers Rd. north of West Florissant Rd., soon lets contract brick, steel chapel and school bldgs. and quarters for sisters. Henry P. Hess, 4005 W. Florissant Ave., St. Louis, Zone 15, archt.

Mo., Pagedale (St. Louis 14 P.O.)—SCHOOL—Concord Lutheran School Assn., Rev. Walter J. Warneck, secy., 1405 Anna Ave., University City, Zone 24, soon lets contract 1 story, part bsmnt., 61x101 ft. and 82x135 ft. L-shaped school, 70 St. and Wells Ave. Kenneth E. Wischmeyer, 911 Locust St., St. Louis, Zone 1, archt.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

IOWA—State Hy. Comn., Ames,

Jensen Constr. Co., 1901 Easton Blvd., Des Moines, Ia., LB **$72,785**, reconstr. railings on Douglas St. Bridge, Potawattamie Co., Ia. and Douglas Co., Neb.;

Shroyer Constr. Co., Newton, Ia., LB, **$64,041** bridges, S-2471 (1), Jasper Co.;

Amos Melberg, 316 19 St. S.E., Cedar Rapids, Ia., LB **$121,597**, bridges, Special F-1014 (1), Linn Co.;

F. A. Moser, Farmersburg, Ia., LB, **$106,708**, bridges, F-246 (6), Wapell Co. Bids Sept. 21. CD 9/9.

IOWA—State Hy. Comn., Ames,

R. B. Burch, Inc., 249 33 St. Dr. S.E., Cedar Rapids, Ia., LB, **$72,560**. grading 2.485 mi. F-246 (6), Wapell Co. Bids Sept. 21. CD 9/9.

Nordberg Mfg. Co., 3300 S. Second St., St. Louis 18, Mo. LB **$358,000**, 3460 hp. **$408,500**, 3860 hp.;

Fairbanks, Morse & Co., 217 S. 8 St., St. Louis 2, Mo. LB **$358,750**, 3500 hp. furnishing, installation dual fuel diesel engine generator for municipal power plant, KENNETT, MO. City, L. A. Pickard, mayor, City Hall, Kennett, Mo. Bids Sept. 16. CD 8/27.

† **Johnson Machine Works, Inc.**, Chariton, Ia. CA **$121,463**. three 33.33 ft. by 39.51 ft. radial gates for Webster Dam, Solomon Division, Missouri River Basin Proj., Spec. DS 4209, KANSAS. Bureau Reclamation, Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, Colo. Bids Aug. 19, awarded Sept. 15. CD 8/26, under CA.

Southwestern Bell Telephone Co., 405 N. Broadway, Oklahoma City, Okla. Owner Builds. **$793,000**. 56 mi. underground cable, Bartlesville to Tulsa, OKLAHOMA. J. B. Kibler, c/o owner, engr. Awarded Sept. 16.

▲ **TEXAS**—State Hy. Comn., Austin,

Texas Bitulithic Co., P.O. Box 10365, Dallas, Tex., CA **$1,142,999**. roadbed tr. and c. conc. 2.531 mi. Hy. U.S. 67, Proj. FI 300 (8) and FGI 800 (9), Hunt Co. Bids Sept. 15, awarded Sept. 21. CD 9/21, under LB.

TEXAS—State Hy. Comn., Austin,

L. H. Lacy Co., 5630 Yale Blvd., Dallas, Tex., CA **$624,743**, c. conc. 6.345 mi. Hy. U. S. 81, Proj. FI 473 (12), Tarrant Co.;

Hugh McMillan, P.O. Box 1227, El Paso, Tex., CA **$569,574**, base, two course surf. tr. 9.443 mi. Hy. U.S. 80, Proj. FI 558 (13), Hudspeth Co. Bids Sept. 14, awarded Sept. 21. CD 9/21, under LB.

City, Midland, Tex. Own Forces. **$85,000**, some street imprvs., surf., MIDLAND, TEX. H. N. Roberts & Assocs., Lubbock, Tex., engrs.

City, Midland, Tex. Own Forces. **$90,000**, sanitary sewer collection lines, MIDLAND, TEX. H. N. Roberts & Assocs., Lubbock, Tex., engrs.

† **Korshoj Constr. Co., Inc. & Claussen-Olson-Benner**, Holdrege, Neb., LB **$222,005**, est. $211,225, rehabilitation El Vado Dam, Middle Rio Grande Proj. Spec. DC 4203, NEW MEXICO. Bureau Reclamation, Dpt. Interior, Bldg. 1A, Denver Federal Center, Denver, Colo. Bids Sept. 16. CD 9/9.

Woodlea Addition, Silsbee, Tex., Owner Builds. **$35,000**, water lines, SILSBEE, TEX.

Woodlea Addition, Silsbee, Tex., Owner Builds. **$65,000**, sanitary-storm sewers, SILSBEE, TEX.

Woodlea Addition, Silsbee, Tex., Owner Builds. **$67,500**. constr. and asph. paving new streets, SILSBEE, TEX.

† **MONTANA**—Bureau P. Rds., Dpt. Commerce, Post Office Bldg., Missoula, rejected bids Sept. 2, bit. paving 9.6 mi. Going-to-the-Sun Hy. in Glacier National Park, Flathead Co. LB **$448,113**. Will re-advertise. CD 9/10, under LB.

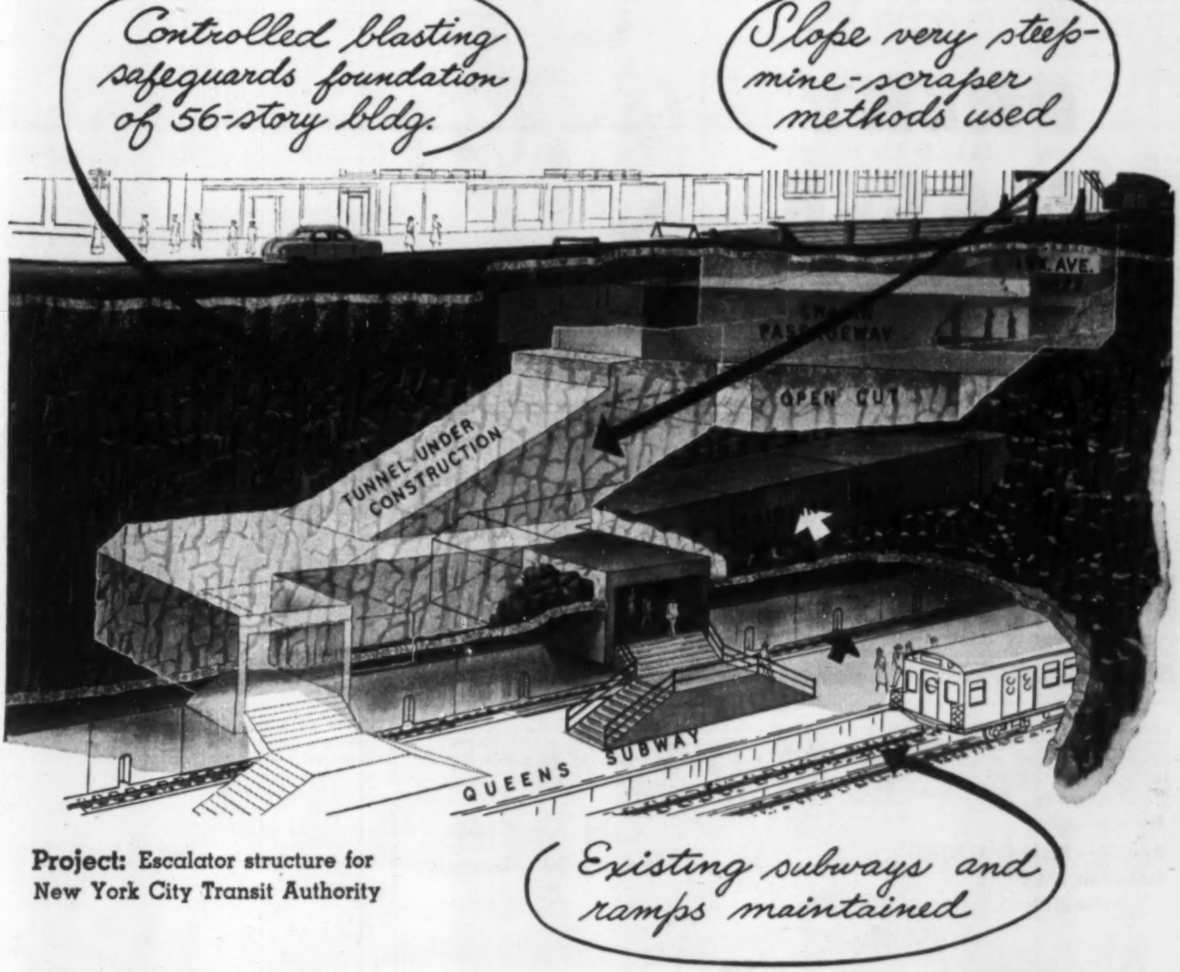
BUILDINGS

LOW BIDS AND CONTRACTS

Schneiderhahn Constr. Co., 450 S. Brentwood Blvd., Clayton 5, Mo. CA Est. **$300,000**. 1 story, ground floor, 72x118 ft., brick, stone, concrete masonry

(Continued on page 336)

ANOTHER PROBLEM SOLVED BY SPENCER, WHITE & PRENTIS



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HASSELBALCH-FINTZELL COMPANY
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PHONE: WEbster 1818 OMAHA, NEBRASKA

(Continued from page 334)

CHURCH, RECTORY, SCHOOL addn. 12124 Larimore Rd., ST. LOUIS COUNTY, MO. St. Aloysius Catholic Parish, Victor J. Gorzel, pastor, 12122 Larimore Rd., St. Louis County, Mo. Maurice Carroll, 5473 Delmar Blvd., St. Louis 12, Mo., archt.

Brockmeyer Constr. Co., 634 N. Grand Blvd., St. Louis 3, Mo. LB **$496,287.** general contract 1 story, ground floor, brick, concrete, steel, masonry HIGH SCHOOL, WASHINGTON, MO. Bd. Educ., Public Schools, Washington, Mo. Bids Sept. 14. CD 8/27.

W. D. Barger Constr. Co., Miami, Okla., CA **$649,000**, Est. $650,000. Municipal AUDITORIUM-CIVIC CENTER, MIAMI, OKLA. City, Miami, Okla. Bids Aug. 31, awarded Sept. 16. CD 9/9,under LB.

Nordburg Mfg. Co., 3073 S. Chase St., Milwaukee, Wis., CA **$117,180**, est. $125,000. DIESEL ENGINE GENERATOR unit for light plant, WAYNOKA, OKLA. City, Waynoka, Okla. Awarded Sept. 15. CD 4/27.

Wilshire Constr. Co., 939 Rittiman Rd., San Antonio, Tex., CA Approx. **$325,000.** 32 DWELLINGS, SAN ANTONIO, TEX. Wilshire Sales Co., 939 Rittiman Rd., San Antonio, Tex. CD 9/8.

FAR WEST

BIDS ASKED—HEAVY CONSTRUCTION

† **Arizona-Nevada**—TRANSMITTER, etc.—BA 10/21—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo. Sch. 1 Item 1, 2 potentiometer or null-balance recorders; Item 2, 6 receiver-recorders; Item 3, transmitter; Item 4, transmitter; Item 5, 2 transmitters; Item 6, 2 receiver-recorders for Phoenix Dispatcher's Office; Sch. 2, Item 7, transmitter equip., Item 8, receiving equip. for Phoenix sub-station; Item 9, transmitter, Prescott Sub-station, Item 10, receiver for Mesa Sub-station, Sch. 3, Item 11, telemetering tone channel equip.; Sch. 4, Item 12, line tuning unit; Item 13, tuning unit, Sch. 5, Item 14, transmitter-receiver set, for Power System, Davis Dam Project, Spec. DS 4251. L. N. McClellan, ch. engr.

† **Wash., Tacoma**—HEATING PLANT—BA 10/26—U. S. Eng., 4735 E. Marginal Way, Seattle, Zone 4, expanding heating plant, McChord Air Force Base, ENG-45-108-55-49. CD 11/5/51.

† **Idaho**—BA 10/28—Bureau Reclamation, Dpt. Interior, Bldg. 53, Denver Federal Center, Denver, Colo. Sch. 1, Item 1, Sch. 2, Item 2, Sch. 3, Item 3, Sch. 4, Item 4 and 5, pumping units for Palisades Dam and Power Plant, Palisades Project, Spec. DS 4250. L. N. McClellan, ch. engr. CD 9/14/44.

† **Arizona**—BA 11/3—Bureau Reclamation, Dpt. Interior, Yuma, earthwork, concrete lateral lining and structures, Unit 2, Dome and Wellton-Mohawk Distribution Systems, Wellton-Mohawk Division, Gila Proj., in Yuma Co., near Ligurta, Spec. DC 4258, W. A. Dexheimer, comr., adv. ENR 10/7. CD 9/21/44.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

IDAHO—State Hy. Dpt., Boise,

Carl E. Nelson Constr. Co., Logan, Utah, LB, **$237,075** roadway, roadmix bit., 3 concrete bridges 3.522 mi. Sawtooth Park Highway, Jerome Co. Bids Sept. 21. CD 9/14.

IDAHO—State Hy. Dpt., Boise,

Morrison-Knudsen Co., 319 Broadway, Boise, Idaho, CA, **$232,494**, roadway, plant mix bit. surf. 1.187 mi. U. S. Hy. 30, Nampa, Canyon Co. Bids Sept. 14, awarded Sept. 16.

Power City Electric Co., N. 920 Howard St., Spokane, Wash., CA, **$70,000** 26 mi. power line in valley of north fork of Clearwater River north of Orofino, IDAHO. Washington Water Power Co., W. 825 Trent St., Spokane, Wash. CD 2/4.

† **U. S. Eng.**, 4735 E. Marginal Way, Seattle 4, Wash. cancelled bids to have been opened Sept. 20, fire station addn., Portland International Airport, Inv. 55-27, PORTLAND, ORE. Will readvertise. CD 9/9.

WASHINGTON—State Hy. Comn., Olympia,

Wilder Constr. Co., 2006 State St., Bellingham, Wash., LB, **$190,503**, imprv. 4.29 mi. Secondary State Hy. 1-D, Island Co.;

R. Weist, N. 27 and River Rd., Yakima, Wash., LB, **$215,748**, imprv. 6.02 mi. Primary State Hy. No. 3, Columbia and Garfield Counties;

Erland & Blickle, P. O. Box 1945, Portland, Ore., LB, **$281,926.** imprv. 2.809 mi. Primary State Hy. No. 12, Wahkiakum Co. Bids Sept. 21. CD 9/9.

† **Electric Constr. Co.**, 1650 Center St., Tacoma, Wash., LB, **$124,000.** 4 transformer buildings and underground electrical distr. sys., Veterans Hospital, Proj. 11-4031, AMERICAN LAKE, WASH. Veterans Admin., Munitions Bldg., Wash. 25, D. C. Bids Sept. 21. CD 8/6.

BUILDINGS

LOW BIDS AND CONTRACTS

White Constr. Co., 1109 Broadway, Vancouver, Wash., LB, **$298,975**, 1 story, part bsmnt., rein.-con. newspaper PLANT, VANCOUVER, WASH. Vancouver Daily Columbian, Vancouver, Wash. D. W. Hilborn, 307 E. 10 St., Vancouver, Wash., archt.

CANADA

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

Caswell Constr. Co. Ltd., 56 Rand St., Kirkland Lake, Ont., CA, **$800,000**, grading, culverts, trestles on 40 mi. new railroad from 33 mi. west of White River in northern Ontario into Manitouwadge Lake mining area ONTARIO. Canadian Pacific Ry., R. A. Emerson,

(Continued on page 338)

CLYDE'S
design features
results in
trouble-free
operation for
over four years!

"Well pleased with the trouble-free, dependable operation of the Clyde hoist," says J. L. Cartwright, hoist operator for J. W. Bateson Company, Inc. of Dallas, Texas.

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Cool running, long wearing frictions give smooth and positive engagement eliminating shock loads on hoist or cable. Large diameter, efficient brakes assure safe and accurate load control at all times. Anti-friction bearings throughout permit higher operating speeds, reduce maintenance costs and result in greater line pulls with less power consumption. Husky pawls, that nestle into deep pocket ratchets lock in or out of engagement for additional safety. Fatigue-free operation with either manual or air operated brakes and clutches.

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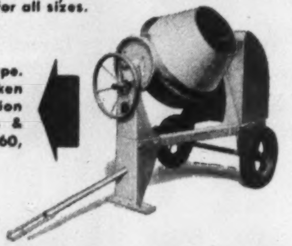
Made in 2, 3½, 6, 6 to 8, and 9 cu. ft. sizes. Electric motor or gas engine power. All models have Muller Lifetime Paddle Shaft Seal to protect bearings. Power throwouts on smaller models, built-in disc clutch on larger. Many other features. Priced $180 to $700 FOB Factory. Rubber scraper blades are available for all sizes.



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3 models, 3 to 6 cu. ft. capacities, tilting type. Ample size drums, fast mixing action, Timken Bearings, electrically welded, sturdy construction throughout. Power—electric motor or Briggs & Stratton Air Cooled Engines. Prices $230 to $660, FOB Factory.

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TRACTOR SPREADER COMPANY
MANUFACTURERS OF THE JERSEY SPREADER
HASBROUCK HEIGHTS, NEW JERSEY

(Continued from page 336)

ch. engr., Windsor Station, Montreal, Que. Awarded Sept. 20. CD 4/2/46.

Walsh-Canadian Constr. Co., 1 Wellington St. W., Toronto, Ont., CA, **$111,130**, storm and sanitary sewers, sewaging pumping sys., R.C.A.F. Station, OTTAWA, ONT. Defence Constr. Ltd., 56 Lyon St., Ottawa, Ont. Bids Aug. 19. CD 7/26.

Poce Constr. Co., 22 Jutland St., Toronto, Ont., CA, **$66,100**, storm sewers in Etobicoke Twp., TORONTO, ONT. Etobicoke Twp., 4946 Dundas St. W., Toronto, Ont. Awarded Sept. 21. CD 4/26/50.

BUILDINGS

LOW BIDS AND CONTRACTS

Ellis-Don Ltd., Box 852, London, Ont., CA, **$564,431**, 3 story, bsmnt., 94x110 ft., rein.-con., stone COURT HOUSE, GODERICH, ONT. Huron Co., County Bldg., Goderich, Ont. Bids Sept. 17, awarded Sept. 22. CD 8/23.

Industrial Warehouse Co. Ltd., 3 Parnell St., Scarborough, Ont., Owner Builds. **$85,000**, 1 story, 60x160 ft., concrete brick FACTORY, SCARBOROUGH, ONT.

Oriole Road Apartments Ltd., 85 Richmond St. W., Toronto, Ont., Owner Builds. **$450,000**, 3 story, bsmnt., sub-bsmnt., 80x133 ft., concrete, brick, APARTMENT, 37 Oriole Rd., TORONTO, ONT. Venchiarutti & Venchiarutti, 2941 Bathurst St., Toronto, Ont., archts.

Robson Realty Ltd., 73 Shallmar Blvd., Toronto, Ont., Owner Builds, **$420,000**. 4 story, bsmnt., 108x208 ft., rein.-con., brick APARTMENT, TORONTO, ONT. Venchiarutti & Venchiarutti, 2941 Bathurst St., Toronto, Ont., archts.

Godard & Frere Ltee, 5319 St. Andre St., Montreal, Que., CA, **$300,000**. RECREATION CENTER, Gifford and Berri Sts., MONTREAL, QUE. Fraternite des Policiers de Montreal, Inc., 1974 St. Catherine St. W., Montreal, Que. Bids Sept. 16. CD 9/7.

Logan & Black, Yorktown, Sask., CA, **$100,000**, 1 story, 100x115 ft., concrete, brick, WAREHOUSE YORKTOWN, SASK. Ashdown Hardware Co. Ltd., Myrtle Ave., Yorktown, Sask. Wm. Swan, Punnichy, Sask., archt.

ALASKA

BIDS ASKED—HEAVY CONSTRUCTION

† **ALASKA**—BA 10/20—Bureau P. Rds., Dpt. Commerce, Juneau, clearing, grubbing, grading, drainage and 144 ft. rein.-con. bridge 4.479 mi. Douglas Hy. Proj. 31-E.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

† **Horness & Morrison**, Box 1972, Anchorage, Alaska, CA **$72,994**, communications and telephone bldg. addns., Schedule A, Items 1 thru 5, Inv. 55-27, Elmendorf Air Force Base, ALASKA. U. S. Eng., Anchorage, Alaska. Bids Sept. 9.

Proposed Projects

WATER SUPPLY

▲ **Ind., Hammond**—City, City Hall, imprvs. at WW incl. new high-lift pumping station, 36-in feeder main, imprv. distr. mains, on south side, **$3,600,000**.

Mich., Grosse Pointe Farms—City, 90 Kerby Rd., bond election Nov. 2, water intake station, Ridge Rd. section, **$150,000**. Murray Smith, c/o owner, engr. CD 4/7, under LB.

N. H., Dover—City, Water Dpt., Washington St., water treatment plant, Lowell Ave., underground reservoir with superstructure over three high pump units. **$150,000**. Charles T. Main, Inc., 80 Federal St., Boston, Mass., consult. engr.

Okla., Alva—City, voted bonds Sept. 21, 21 mi. 16 in. water supply lines. **$650,000**. R. D. Alexander, Terminal Bldg., Oklahoma City, consult. engr. CD 9/15.

Okla., El Reno—City, WW imprvs. **$700,000**. C. A. Bentley, city engrs.

Okla., Woodford—City, addnl. well water supply. **$500,000**. R. D. Alexander, Terminal Bldg., Oklahoma City, consult. engr.

Tex., Kaufman—City, voted bonds Sept. 4, water supply. **$130,000**. CD 9/16.

Tex., Lufkin—City, replacing 12 in. c.i. water main with 24 in. **$90,000**, CD 4/23; water pumping imprvs. **$35,000**; 5 mi. c.i. water mains, distr. lines, **$100,000**; 500,000 gal. elevated steel storage tank, **$60,000**; two water wells, **$65,000**.

▲ **Tex., Mesquite**—City, water lines (water to come from Lavon Reservoir). **$1,000,000**. Homer A. Hunter, 3708 Abrams Rd., Dallas, consult. engr. CD 1/8/51.

Tex., Palestine—City, voted bonds Sept. 11, one or two water supply wells, 2,500 ft., **$140,000**; water mains, storage, **$70,000**. CD 3/26.

Tex., Sulphur Springs—City, voted bonds Sept. 19, water storage, **$35,000**; c.i. water lines, **$78,500**; water supply, **$55,000**.

SEWERS, WASTE DISPOSAL

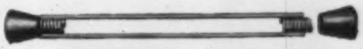
▲ **Colo., Brighton**—South Adams County Sanitation District, Derby, defeated **$1,500,000** bonds sanitary sewerage system and sewage disposal plant. Ripple &

(Continued on page 341)

DEPENDABLE CONCRETE FORMING WITH . . .

SNAP TIES

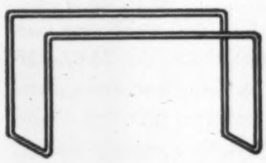
STANDARD COIL TIES



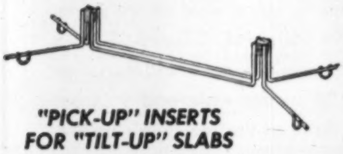
CONE-FAST COIL TIES

STANDARD HANGER FRAMES

SPECIAL HANGER FRAMES



WIRE BEAM SADDLES



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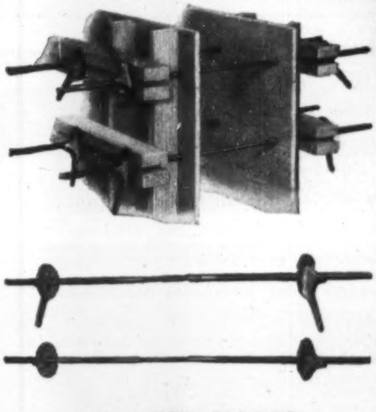

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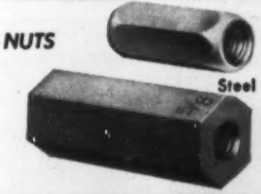

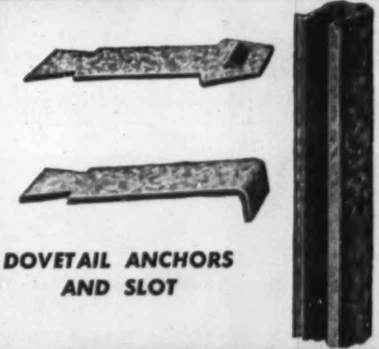

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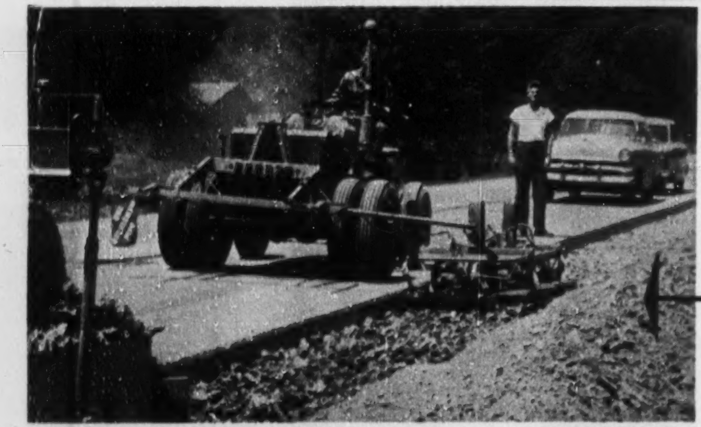
On jobs such as this, soil-bound macadam — 5 inches thick, the JACKSON MULTIPLE COMPACTOR, ***now more powerful than ever***, achieves specified density in JUST ONE PASS. It is equally efficient on rock, or slag base and all other granular soils.



Quickly adaptable to widening, the JACKSON MULTIPLE COMPACTOR is shown here consolidating slag macadam base course 36 inches wide and 9 inches thick. Using three of the machine's powerful compactor units in tandem, it readily obtains specified density in ONE PASS.

Twin hook-up of manually guided JACKSON COMPACTORS consolidating gravel base for a large pavement repair area. These machines, used singly or in tandem, or side-by-side twin hook-ups, are exceedingly efficient for all types of granular soil base and fill compaction; also for bituminous patching and driveway construction. Operated from a trailer-mounted JACKSON POWER PLANT which may also be used for other power tools and lights.

See your Jackson Distributor or write to us for complete information on these machines.

JACKSON VIBRATORS, INC. LUDINGTON, MICHIGAN

(Continued from page 338)

Howe, 526 Cooper Bldg., Denver, consult. engrs. and archts. CD 9/1.

Colo., Denver—City and Denver Co., City and County Bldg., Sanitary Sewer District No. 322, **$145,650.** Dewey Wright, city engr.

Colo., Greeley—City, City Hall, sewage collection and treatment system. Over **$200,000.** Ken R. White, 941 East 17 Ave., Denver, consult. engr. and archt.

Mich., Monroe—City, **$300,000** bond election Nov. 2, sanitary sewer and street imprvs. CD 11/21/44.

Minn., Robbinsdale—City, E. A. Jaenisch, clk., voted **$130,000** bonds, storm sewer for McNair Manor area. CD 5/15/47.

O., Perrysburg—Village, sewage treatment plant and interceptors, **$480,000;** trunk line along Grassy Creek, **$156,000.** Carleton S. Finkbeiner, village engr. CD 12/16/46.

▲ **O., Warren**—City, sewage disposal and plant interceptor sewer from north city line to treatment plant **$1,800,000;** pumping station and plant, **$2,500,000;** storm relief and industrial waste sewer to relieve Red Run Sewer, **$1,420,000;** rebuild parts of Red Run Sewer and others, **$390,000;** drains and other relief sewers to reach main lines, **$290,000.** Havens & Emerson, Leader Bldg., Cleveland, consult. engrs. CD 5/19/52.

Okla., Wynnewood—City, bond election Oct. 19, sewage disposal plant. **$172,000.** Lee M. Bush & Co., Colcord Bldg., Oklahoma City, consult. engrs. CD 5/5.

Tex., Bryan—J. C. Culpepper, Bryan, sanitary sewers, **$65,000;** storm sewers, **$65,000,** 300-acre tract off Texas Ave. and Hy. 6.

Tex., Duncanville—T. K. Irwin, Sr., Irvin-Keasler Bldg., Dallas, storm sewers, **$67,500;** sanitary sewer collection lines, **$75,000.**

Tex., Garland—M. C. Cole, 6238 Parkdale St., Dallas, storm sewers, **$60,000;** sanitary sewers, **$65,000** in Monica Park Subdivision, off Belt Line Rd.

Tex., Houston—John S. Dunn & Assocs., 809 Caroline St., sanitary sewers, **$75,000;** storm sewers, **$70,000,** 228-acre tract Westheimer Rd., 17 mi. from downtown Houston.

Tex., Houston—Syndicate (Houston Business Men), c/o C. M. Hudspeth, trustee, Guaranty Bldg., storm sewers, **$75,000;** sanitary sewers, **$85,000,** 510-acre tract on Bammel-Westfield Rds., near here.

Tex., Mesquite—Walter Hailey, Mesquite, sanitary sewers, **$60,000;** storm sewers, **$60,000.**

Tex., Mesquite—Rex Range, c/o Range Hood Co., 2006 Deer Path Dr., Dallas, sanitary sewers, **$65,000;** storm sewers, open drainage, **$67,500.**

Tex., Mesquite—John Rawlins, c/o Court House, Dallas, sanitary sewers, **$70,000;** storm sewer lines, open drainage, **$65,000,** Military Dr. and U. S. Hy. 80.

Tex., San Antonio—Roy Pletz, South Texas Bldg., storm sewers, **$67,500;** sanitary sewer collection lines, **$67,500,** 141-acre tract out of Sunshine Ranch. Leonard A. Westby, 123 Blakely St., consult. engr. CD 8/25.

Tex., Sulphur Springs—City, voted bonds Sept. 14, sanitary sewer lines, **$110,000;** sewage disposal unit, **$60,000.** CD 5/16/51.

Wis., Clintonville—City, enlarging sewage treatment plant, **$159,324,** Baxter & Woodman, 123 N. Williams St., Crystal Lake, Ill., consult. engrs.

BRIDGES

Idaho, Boise—City and Ada Co., City Hall, 440 ft. bridge concrete piers, arch-type stringers, 4 traffic lanes, **$300,000. Smith & Milhollin, 623½ Main St.,** archts.

Wash., Aberdeen—City, City Hall, voted bonds Sept. 14, bridge across Wishkah River in North Aberdeen, **$140,000.**

▲ **Wash., Mount Vernon**—Skagit Co., Court House, defeated bonds, 248 ft. plate-girder swing span with 109 ft. prestressed concrete approaches at each end over Swinomish Slough at La Conner, **$400,000.** H. R. Powell, Smith Tower, Seattle, Zone 4, consult. engr., H. O. Wahlberg, co. engr.; 1 bridge at Roxville, **$400,000** and another at Rockport across Sauk River, **$400,000.** CD 8/13.

QUEBEC—Province of Quebec, Dpt. P. Wks., Quebec City,

Laviolette Co.—bridge over Riviere La Petite Croche, **$100,000;**

bridge over Riviereaux Escoliers, **$100,000.** O. Desjardins, c/o owner, engr.

STREETS AND ROADS

▲ **D. C., Wash.**—D. C. Govt., Highway Dept., 499 Pa. Ave. N.W., paving Independence Ave. 7 to 11 Sts. S.E., **$105,000;** paving Independence Ave., 15 to 19 Sts. S.E., **$338,000;** paving Constitution Ave., 1 to 7 Sts. N.E., **$180,000;** paving Seward Square and C Sts. S.E., **$82,000;** paving East Capitol St., Texas Ave. to 47 St., **$180,000;** paving Kenilworth Ave. N.E. Interchange area, **$600,000;** paving Kenilworth Ave., Benning Road to Eastern Ave., **$1,003,000;** paving C St. N.E., 1 to 19 Sts., **$445,000;** paving North Carolina Ave., 14 to 16 Sts. N.E., **$75,000;** paving Armory Plaza, **$700,000.** CD 7/14/44.

▲ **Mo., Kansas City**—City, City Hall, surf. for existing streets, **$500,000;** exten. Brown Ave. from 27 St. eastward to 12 St., **$900,000.** CD 8/6/54.

Neb., Lincoln—City, City Hall, paving streets in Home Buildings Housing Proj., north of Fremont St. **$141,000.** Carl Fisher, city engr.

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Product of 30 years of Ozalid experience, the 800 is a compact model of advanced design with phenomenal production capacity.

It handles roll or sheet stock as wide as 42", *prints and develops in continuous one-step operation* as fast as 30 feet a minute, with front or rear delivery. Easy to operate —all controls close at hand, big feedboard, and twin blowers carry off heat and vapors.

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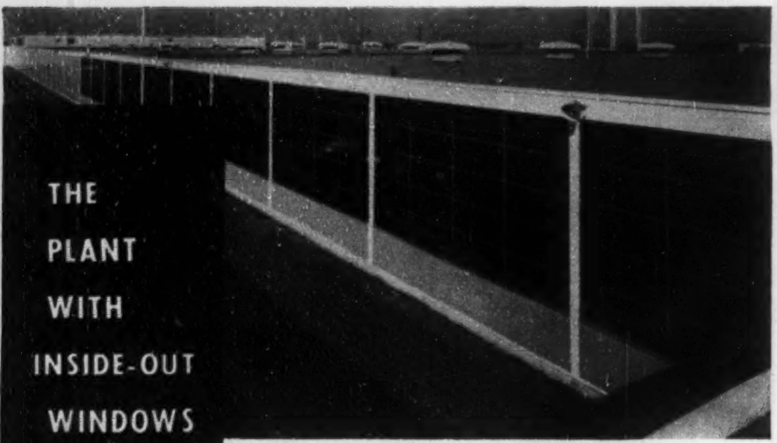

Luxlite Coolite (glare reduced) installed in sidewall sash at Sawyer Biscuit Company, Melrose Park, Illinois.
Skidmore, Owings & Merrill, Architect, George A. Fuller Company, General Contractor, Hamilton Glass Company, Glazing Contractor.

Plant Exterior of Unusual Beauty and Utility Achieved by Novel Installation of Coolite Glass

By installing the pattern side of Mississippi Coolite glass on the *inside*, the windows have an exterior color of deep blue porcelain. From the inside, Coolite, Heat Absorbing and Glare Reducing glass combines all the recognized light distributing qualities of the pattern . . . floods work areas with glare-free daylight. For Coolite filters out the unwanted factors in "raw" sunlight, helps keep plant interiors cooler, more comfortable. Employees see better, feel better, work better in natural daylighting that has been Coolite-conditioned.

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Neb., Omaha—City, City Hall, building 42nd St. through from L to Q Sts., which necessitates constr. of viaduct. **$150,000.** E. W. Woodbridge, city engr.

▲ **Okla., Tulsa**—Tulsa Co., Court House, bond election Nov. 2, highway rights of way and bridges. **$2,435,000.** George Straughn, c/o owner, engr. CD 7/13/50.

Tex., Andrews—Andrews Co., Andrew, road imprvs. (for 1955). **$100,000.** CD 6/24/53.

Tex., Brownsville—Cameron Co., Comrs. Court, Brownsville, connecting three public parks by a 5-mi. Blvd. up the south tip of Padre Island. **$130,000.** Joe Harris, co. engr. CD 9/10/52.

▲ **Tex., Falfurrias**—Brooks Co., Falfurrias, road constr. (for 1955). **$1,150,000.** CD 4/1.

Tex., Gail—Borden Co., Gail, road constr. and imprv. old roads, during 1955. **$106,000.** CD 9/28/51.

Tex., Houston—Syndicate (Houston Business Men), c/o C. M. Hudspeth, trustee, Guaranty Bldg., constr. and paving streets, 510-acre tract on Bammel-Westfield Rd., near here. **$100,000.**

Tex., Lufkin—Angelina Co., Lufkin, new road constr. and imprvs. and maintenance for old county roads (for 1955). **$175,000.**

Tex., Rockport—Aransas County Navigation Dist., c/o Comrs. Court, Rockport, voted bonds Sept. 14, hard type paving in parking areas around harbor, **$75,000;** street paving, **$80,000.** CD 9/3.

Wash., Renton—City, City Hall, defeated bonds wid'n. Park St., installing mercury vapor lights and traffic signals throughout city. **$117,000.** CD 7/28.

EARTHWORK, WATERWAYS

▲ † **Texas**—Soil Conservation Service, Dpt. Agriculture, 3600 McCart St., Fort Worth, 29 flood control dams in Pin Oak Creek Watershed area in vicinity of Mexia, embraces corners of 3 counties, covering 109,000 acres, Limestone, Navarro and Hill Counties. **$1,450,000.**

Tex., Port Lavaca—Calhoun Co., Port Lavaca, voted bonds Aug. 21, digging master ditch in Dr. No. 10, **$75,000;** digging lateral ditches to East Coleman Creek. **$37,000.** CD 8/27.

Tex., Rockport—Aransas County Navigation Dist., c/o Comrs. Court, Rockport, voted bonds Sept. 14, dredging and deepening harbor, **$115,000;** dredging and completion of Fulton Harbor, **$145,000;** harbor development at Cove, near here, **$100,000.** CD 9/3.

▲ **Alberta**—Calgary Power Ltd., 140 First St., Calgary, hydro-power development, on North Sasketchewan River, Nordegg. **$5,000,000.**

AIRPORTS

† **Calif., Muroc**—GYMNASIUM, etc.—U. S. Eng., 751 S. Figueroa St., Los Angeles, plans by Stiles Clements, 210 W. 7 St., Los Angeles, gymnasium and parking lot at Edwards Air Force Base, **$332,000.** CD 8/30.

† **Ga., Albany**—AIRPORT IMPRVS.—U. S. Eng., 200 E. St. Julian St., Savannah, plans by J. E. Greiner Co. & Assocs., consult. engrs. and archts., P.O. Box 1391, design of FY-56 program, Turner Air Force Base.

† **Mich., Alpena**—BARRACKS, etc.—Dpt. Army, National Air Guard Base, Alpena, barracks, outbldgs. and revamping airplane hangar, fuel service, dining facilities, **$200,000.**

Mich., Grand Rapids—RUNWAY—State, State Bd. Aeronautics Capital Airport, Lansing, 5,700 ft. runway, taxiway Kent County Airport, **$720,000,** L. C. Andrews, Capital City Airport, Lansing, ch. engr. CD 2/16/53.

▲ **Ore., Portland**—AIR TERMINAL—Port of Portland, Swan Island, Portland, plans by Burns, Bear, McNeil & Schneider, 2940 S.E. Belmont St., air terminal, Portland International Airport, **$2,300,000.** CD 3/24/49.

▲† **Tex., Del Rio**—FACILITIES—U. S. Eng., P. O. Box 1229, Galveston, plans by Parr & Aderhold, archts.-engrs., 513 N. Broadway, Oklahoma City, Okla., design of air force facilities, Laughlin Air Force Base. **$5,000,000.** CD 7/2/51.

▲† **Va., Langley Air Force Base**—HANGAR—U. S. Eng., foot of Front St., Norfolk, plans by Williams, Coile & Blanchard, 35 and Virginia Aves., Newport News, maintenance hangar. **$1,000,000.** C. J. Robin, c/o owner, engr. CD 9/11/52.

LATIN AMERICA

▲ **Mexico, Mexico City**—Sria. de Salubridad (P. Health Ministry), Mexico City, plans headquarters bldg. **$2,500,000.**

PUBLIC BUILDINGS

Calif., Fontana—SCHOOL—Fontana School District, Fontana, plans by J. Dewey Harnish, 222 E. "B" St., Ontario, 27,700 sq. ft., frame, stucco, Oleander Elementary School. **$400,000.** CD 5/19/53.

▲ **Calif., Redwood City**—SCHOOLS—Sequoia Union High School Dist., Redwood City, bond election Nov. 2, two high schools, **$6,250,000.** CD 5/27/52.

▲ **Ind., New Castle**—SCHOOL—New Castle-Henry-Twp. Schools, New Castle, plans by Boyd E. Phelps, Inc., K. of P. Bldg., Indianapolis, Zone 5, high school. **$2,500,000.**

(Continued on page 344)

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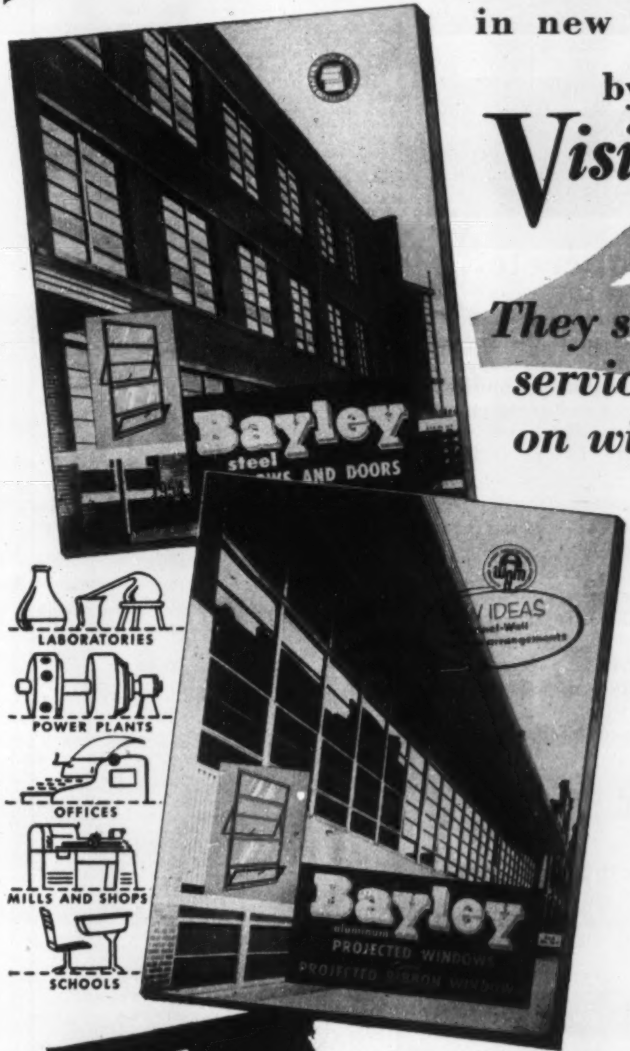
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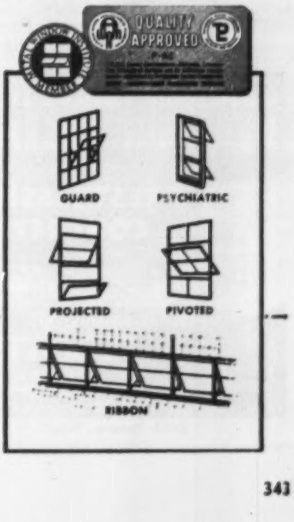
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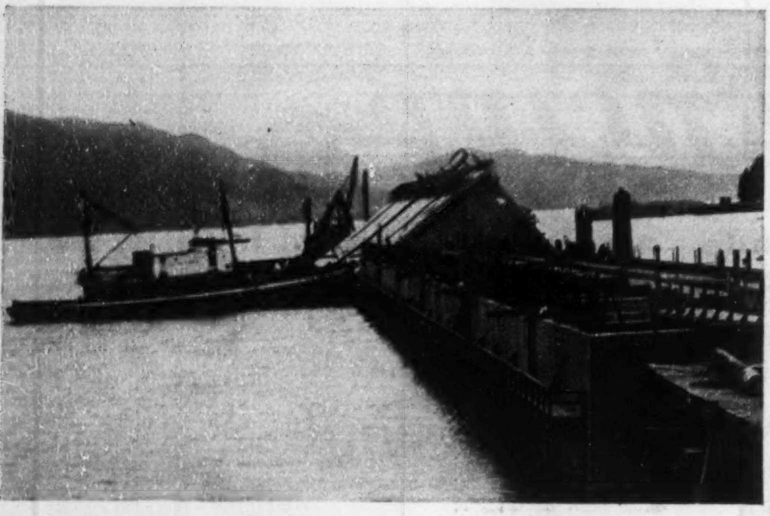

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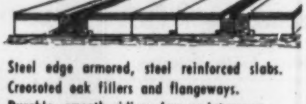

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(Continued from page 342)

Ia., Mount Vernon—SCHOOL—Bd. Educ., voted **$335,000** bonds, Sept. 14, elementary school CD 7/29.

▲ **Kan., Lawrence**—HOSPITAL—City, **$1,000,000** bond election Oct. 19, Lawrence Memorial Hospital addn.

Md., Upper Marlboro—SCHOOL—Prince George's Co. Bd. Educ., plans by Paul H. Kea, 5109 Baltimore Ave., Hyattsville, Fairmont Heights High School addn., Seat Pleasant. **$350,000.**

Mass., **Fitchburg**—HOUSING—Fitchburg Housing Auth., 13 Nurmandy Rd., plans by William Hoslins Brown, 125 Tremont St., Boston, 45 housing units, **$315,000.**

Mass., **Somerville**—HOUSING—Somerville Housing Auth., 30 Memorial Rd., plans by Robert Woods Kennedy, 9 Shady Hill Square, Cambridge, 75 housing units, **$525,000.** CD 12/14/45.

Mich., **Ann Arbor**—DENTAL—Bd. Regents, University of Michigan, W. K. Pierpont, vice pres., Service Bldg., dental bldg., North Campus. **$500,000.**

Mich., **East Detroit**—HOSPITAL—South Macomb County Hospital Auth., Mrs. Leroy Howard, chn., plans by Sewell & Schoettley, 730 Michigan Bldg., Detroit, hospital, Kelly St. between Stephens and Ten Mile Rd., **$750,000.**

Mich., **Lansing**—NURSES HOME—Bd. Supervs. Ingham Co., Mason, nurses home, remodeling part of Ingham County Chest Hospital. **$530,000.**

▲ Mich., **Lansing**—OFFICE—State, A. N. Langius, dir. State Bldg. Dpt., Lewis Cass Bldg., 300 S. Walnut St., 2 state office bldgs. to house Justice Dpt., and other state offices. **$7,000,000.**

Mich., **Pontiac**—SCHOOLS—City, Bd. Educ., Pontiac, plans by H. E. Beyster & Assoc., 2000 Industrial Bank Bldg., Detroit, elementary school, **$300,000;** elementary school, Kennett Rd., **$325,000.**

▲ Mich., **St. Joseph**—COURT HOUSE—Bd. Supervs. Berrien Co., 1121 Milton Rd., **$2,500,000** bond election Nov. 2, county court house and infirmary. Bond election defeated 8/3. CD 6/28, 3/24.

Minn., **Marshall**—SCHOOL—Bd. Educ., Dr. M. J. Carrow, clk., $700,000 bond election Oct. 19, West Side Grade School, East Side Grade School addn., **$800,000.** Pass & Rockey, Mankato, archts. CD 7/6.

Minn., **South St. Paul**—SCHOOL—Bd. Educ., c/o clerk, **$700,000** bond election Oct. 19, school. CD 10/13/50.

Miss., **Winona**—HOSPITAL—Montgomery Co., hospital, **$391,500.** CD 4/7/50.

Mo., **Sugar Creek**—SCHOOL—Bd. Educ., **$620,000** bond election Oct. 26, grade school. CD 8/2.

Mont., **Missoula**—DORMITORY—State, Bd. Educ., Capitol Bldg., Helena, men's dormitory at Montana State University. **$600,000.**

Neb., Aurora—HIGH SCHOOL—School Dist. 4-R, Hamilton Co., Aurora, **$550,000** bond election Oct. 19, high school. CD 7/16.

Neb., Peru—HOUSING UNITS—State Normal Bd., Capitol Bldg., Lincoln, constr. 24-housing units for faculty and married students at State Teachers College. **$300,000.** CD 4/18/51.

▲ **N. Y., Kew Gardens**—HIGH SCHOOL—Bd. Educ., 49 Flatbush Ave. exten., Brooklyn Zone 1, plans by S. J. Kessler & Sons, 551 Fifth Ave., New York Zone 17, 3 story Junior High School 217, 85 Ave. between 144 St. and 148 St., E-817. **$2,912,000.**

O., **Avon Village** (Lorain P. O.)—SCHOOL—Avon School Bd., **$500,000** bond election Nov. 2, high school. Caldwell & Caldwell, Engineers Bldg., Cleveland, Zone 14, archts.

O., **Columbus**—SCHOOL—Bd. Educ., 270 E. State St., school addn., 1270 Hawthorne Ave. **$510,861.** CD 11/6.

O., **Columbus**—DORMITORIES—Bd. Trustees Ohio State University, N. High St., plans by Howard Dwight Smith, University Archt., c/o owner, four men's dormitories, each for approx. 300 students, W. 11 Ave.; 11 story dormitory for 325 women. CD 11/27.

O., **Miamisburg**—POWER PLANT, etc.—City, imprv. and expand power plant and distr. sys. **$913,757.**

▲ **Ore., Astoria**—SCHOOL—Astoria School Dist. plans by Stewart & Richardson, 219 S.W. Stark St., Portland, three-wing high school. **$1,000,000.** CD 8/29/45.

▲ **Pa., Ardmore**—SCHOOLS—Lower Merion Twp. School Dist., Ardmore, **$5,100,000** bond election Nov. 2, schools. CD 8/6/53.

Pa., **Bellwood**—SCHOOL—Bellwood Antis School Dist. plans by Hunter, Caldwell & Campbell, 3601 Fifth Ave., Altoona, 1 story, bsmnt., brick, steel grade school, **$346,188;** 1 story, bsmnt., brick, steel high school addn., alterations, **$455,000.** CD 8/15/52.

Pa., **New Kensington**—SCHOOL—School Dist. of Lower Burrell Twp., R.D. 1, New Kensington, plans by Enos Cooke, 316 Carles St., brick, block Gladeview Grade School Addn., near here. **$300,000.**

Pa., **Pittsburgh**—SCHOOL—Bd. Educ., Forbes and Bellefield Ave., Belmar Grade School addn., alterations. **$410,000.**

▲ **Pa., Rochester**—SCHOOL—Rochester Joint School Dist. plans by Michael Baker Jr. Assoc., Rochester, brick, block Junior Senior High School. **$1,500,000.**

R. I., **Howard**—HOSPITAL—State of R. I. and Prov. Plants, F. A. Adams, purch. agt., State House, Providence, hospital and remodel existing bldg.-cafeteria, Rhode Island State Hospital. **$500,000.** Charles A. Maguire & Assoc., 1100 Turks Head Bldg., Providence, consult. engrs. CD 8/31/43.

† **Tenn., Oak Ridge**—LABORATORY—Atomic Energy Comn., Oak Ridge, plans by H. K. Ferguson Co., Inc., archt.-consult. engr., 1783 E. 11 St., Cleveland, O., 2 story, 92x80 ft. bsmnt. laboratory to study effect of radiation on solids. Union Carbide & Carbon Co., will operate. **$700,000.** CD 8/30.

(Continued on page 346)

A comparative cost analysis of a typical bay (16′ wide x 61′ long x 4 floors high) in this school building showed that flat plate reinforced concrete, with columns cast in round forms, was $1300 less expensive than other conventional types of construction. This saving helped attain an average cost of only $11.77 per sq ft. Furthermore, according to the architect, reinforced concrete gave ". . . the best fireproofing" and ". . . a structure that will take severe abuse without springing or deflecting."

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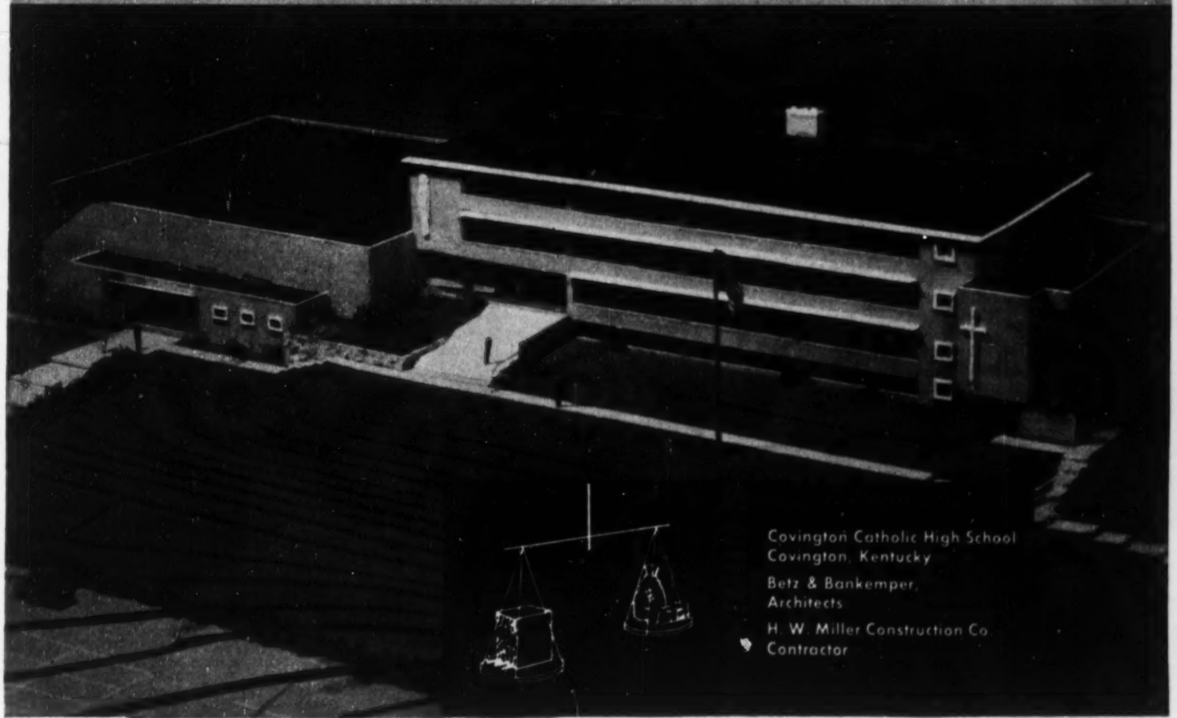

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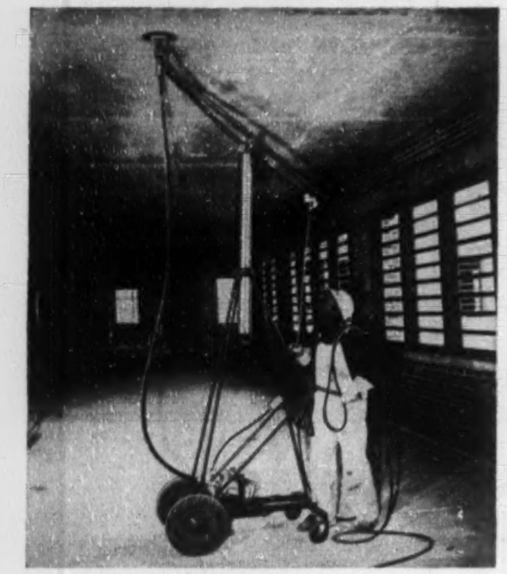

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(Continued from page 344)

Tex., Austin—HEADQUARTERS—State Hy. Comn., Austin, plans by Kuehne, Brooks & Barr, Perry-Brooks Bldg., district headquarters bldg., facing International Expressway, 1 mi. north of Hy. 290. **$300,000.**

Tex., Corpus Christi—STORAGE—Corpus Christi Independent School Dist., 515 N. Carancahua St., plans by Whitney & Tomlinson, 468 Palmera St., 1 story 18,000 sq. ft. masonry food storage. **$125,000.** CD 8/6.

Tex., Yorktown—SCHOOL—Yorktown Independent School Dist. Yorktown, voted bonds Sept. 11, school. **$450,000.**

Va., Fairfax—SCHOOL—Fairfax Co. School Bd., Court House, plans by Wilgoos & Chase, 300 Montgomery St., Alexandria, 3 slab on ground area 61x180 ft., 62x166 ft., and 42x66 ft. and a 2nd story, 61x180 ft. masonry Cedar Lane School. **$350,000.** Beall & LeMay, 1726 M St. N. W., Wash. D. C. consult. engrs. CD 3/5.

▲† **Va., Fort Eustis** — OFFICERS QUARTERS — U. S. Eng., foot of Front St., Norfolk, plans by Mills, Petticord & Mills, archts.-consult. engrs., 3308 14th St. N.W., Wash., D. C., four 60-man bachelor officers quarters. **$1,000,000.** C. J. Robin, c/o owner, engr.

† **Va., Fort Lee**—POST EXCHANGE—U. S. Eng., foot of Front St., Norfolk, plans by Marcellus Wright & Son, 100 E. Main St., Richmond, post exchange bldg. **$400,000.** C. J. Robin, c/o owner, engr.

▲ **Va., Nottoway** — SCHOOLS — Nottoway Co., Court House, Nottoway, 3 elementary schools. **$1,170,000.**

▲ **Va., Richmond**—STATE OFFICE—Commonwealth of Va., Capitol Bldg., plans by Merrill C. Lee, 601 E. Franklin St., 15 story bsmnt., sub-bsmnt., concrete frame, limestone exterior with concrete masonry back-up State Office Bldg. **$3,000,000.** McFarlane & Sadler, 300 E. Main St., consult. engrs. Stuart Moore, 117 N. Ballard St., Div. of Inst. Engrg. CD 11/25/52.

Wash., Blaine—SCHOOL—School Bd., Blaine, voted bonds Sept. 14, Junior High School, **$463,000.** W. A. Johnson & Assocs., First Natl. Bank Bldg., Everett, archts. CD 11/16/50.

Wash., Ferndale—SCHOOL—School Bd., Ferndale, voted bonds, Junior High School, **$463,000.** Bebb & Jones, Hoge Bldg., Seattle, Zone 4, archts. CD 4/28.

▲† **Wash., Fort Lewis**—MILITARY HOUSING—U. S. Eng., 4735 E. Marginal Way, Seattle, Zone 4, plans by Durham, Anderson & Friede, 1100 Denny St., Seattle, military housing. **$10,000,000.** CD 11/7/51.

▲ **Wash., Kennewick**—SCHOOLS—School District No. 17, Kennewick, voted bonds, Lakeside Elementary School, **$600,000,** J. G. Villesvik, Liberty Bldg., Yakima, archt.; another elementary school, **$600,000;** Junior High School, **$1,000,000.** CD 7/51.

Wash., Port Angeles — COURT HOUSE — Clallam Co., Court House, plans by Johnson & Botesch, First Natl. Bank Bldg., Everett, 2 story, bsmnt., 64x109 ft., rein.-con. court house addn. **$495,000.**

▲ **Wash., Puyallup**—SCHOOL—School Bd., Puyallup, bond election Nov. 2, Junior High School. **$1,500,000.** CD 1/15/51.

Wash., Seattle—SCHOOL—South Central School District 306, 14208 42 Ave. S., voted bonds, Foster Junior-Senior High School addn. **$300,000.**

▲ **Wash., Tacoma**—SCHOOLS—School District No. 10, 601 S. 10 St., defeated bonds Sept. 14, Sound End Junior High School adjacent to Harmon Playfield, S 83 and J Sts., **$800,000,** R. B. Price & M. W. Perrow, 2007 A St., archts.; West End High School, **$2,000,000,** Lea, Pearson & Richards, Tacoma Bldg., archts. CD 6/30.

Wash., Tumwater—SCHOOL—School Bd., Tumwater, bond election Nov. 2, grade school. **$306,000.**

Wash., Yakima—SCHOOLS—Highland School Dist. 203, voted bonds, 2 elementary schools **$600,000.** CD 8/20.

Wis., Beloit—MUNICIPAL—City, municipal bldg. addn. **$350,000.** Carl Lloyd Ames, 3625 A.W. North Ave., Milwaukee, consult. engr.

Wis., Eau Claire—LIBRARY—Bd. Regents of State College, Madison, plans by R. C. Kirchoff, state archt., Madison, library. **$850,000.**

Wis., La Crosse—PHYSICAL EDUCATION—Bd. Regents of State College, Madison. Plans by C. R. Kirchoff, state archt., Madison, physical education bldg. addn., **$750,000.** CD 7/9.

Wis., Oshkosh—TRAINING SCHOOL—Bd. of Regents of State College, Madison, plans by R. C. Kirchoff, state archt., Madison, training school. **$850,000.**

Wis., Platteville—PHYSICAL EDUCATION—Bd. Regents of State College, Madison, plans by R. C. Kirchoff, state archt, physical education. **$750,000.**

Wis., River Falls—TRAINING SCHOOL—Bd. Regents of State College, Madison, plans by R. C. Kirchoff, state archt., Madison, training school. **$850,000.**

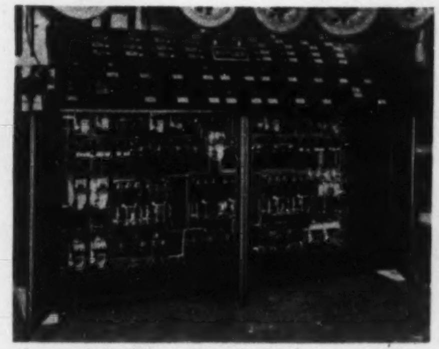
Wis., Union Grove—SCHOOL—State Dpt. P. Welfare, 315 S. Carroll St., Madison, plans by R. C. Kirchoff, Madison, state archt., school at Southern Colony & Training School. **$300,000.**

▲ **Wis., Whitewater**—TRAINING SCHOOL, etc.—Bd. Regents of State College, Madison, plans by R. C. Kirchoff, state archt., Madison, training school. **$850,000;** physical education and health bldg. **$750,000.**

▲ **Man., Winnipeg**—SCIENCE SERVICE LABORATORY—University of Manitoba, Fort Garry, plans by Moody & Moore, 295 Broadway Ave., 2 story, bsmnt., 60x210 ft., brick, stone science service laboratory. **$1,000,000.** CD 12/31/45.

N. B., Moncton—NURSES HOME—Moncton City Hospital, Moncton, plans by J. B. Langley, 515 Jarvis St., Toronto, Ont., 2 story nurses home, **$350,000.**

(Continued on page 349)



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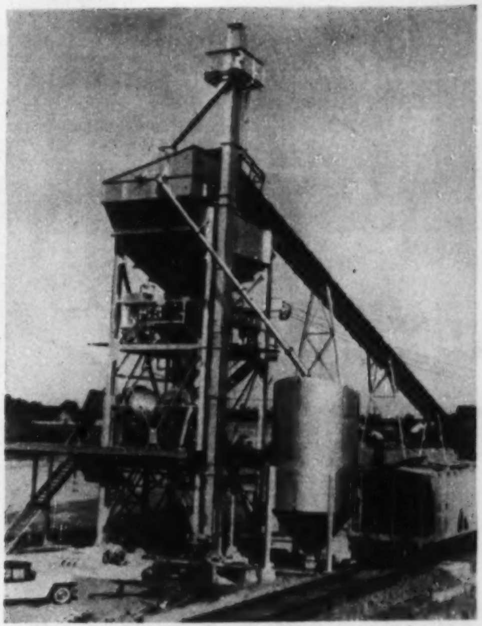

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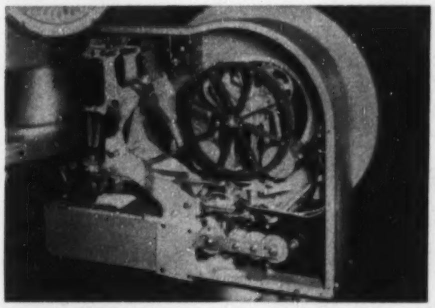
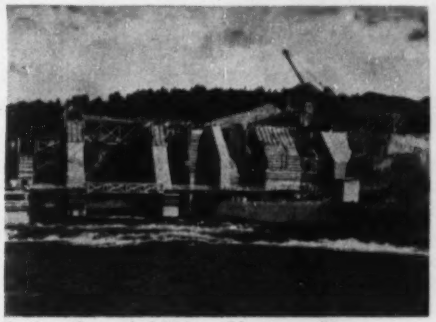
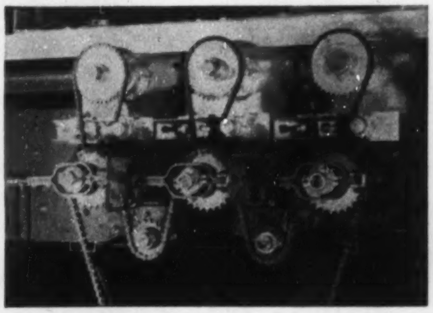




Butler Central Mixing Plant on New Brunswick Dam job. This is one of many Butler plants used on Canada's huge hydro-electric expansion.

In many Butler plants air-operated clutches open gates to select any one of three types of cement.



Automatic batching — whether for the highway or the ready mixed industry — has proved itself in elimination of wasted materials, sharp reduction of labor costs and faster production. Butler engineers have achieved high automation to bring concrete production in line with the economies of electronic controls in other industries. Existing ready mixed concrete or road builders plants can be easily and economically revised for automatic operation and, of course, new plants are readily engineered for highest efficiency at any production level.

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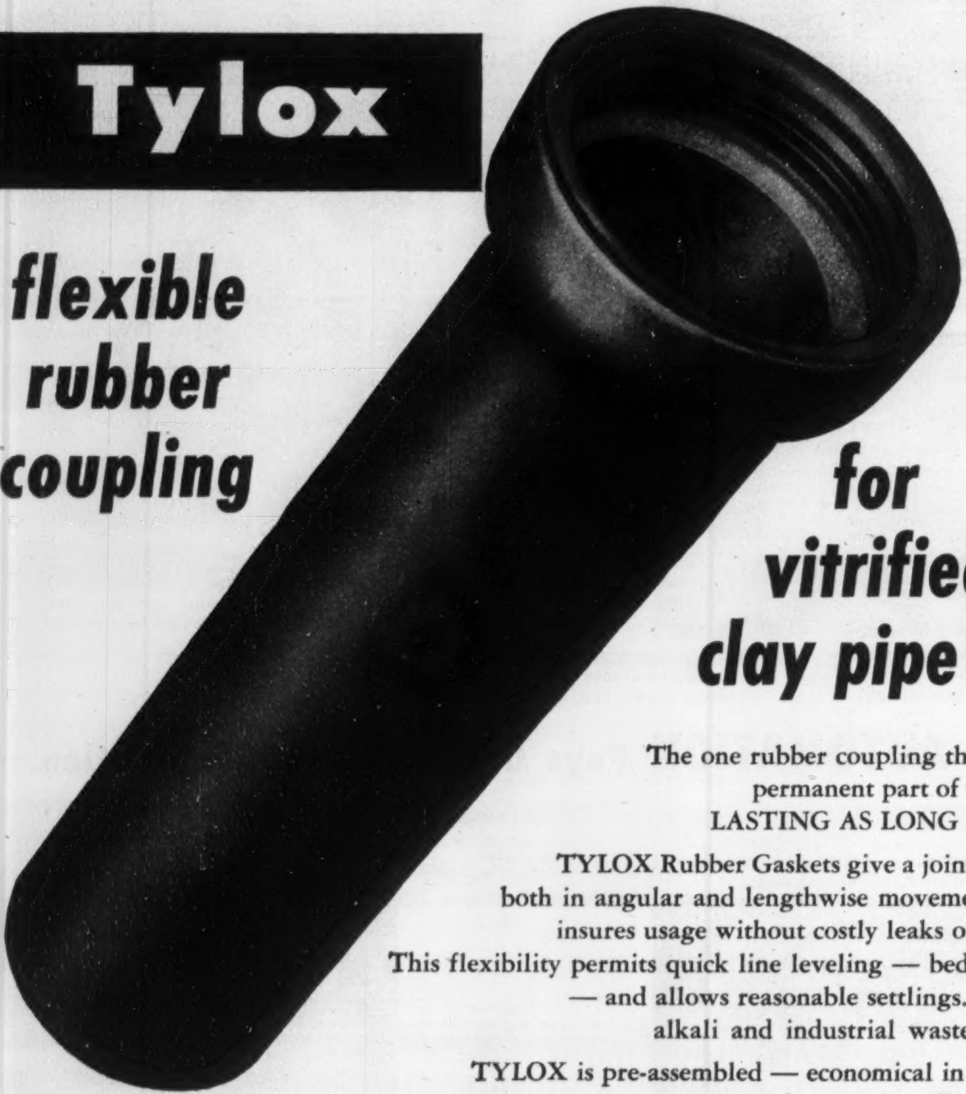

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(Continued from page 346)

Ont., London—DINING HALL—University of Western Ontario, Dr. G. B. Hall, pres., London, plans by O. Roy Moore, 260½ Dundas St., 2 story, 115x156 ft., stone dining hall. **$350,000.** CD 3/25.

Que., Montreal—SCHOOL—Catholic School Comn., 117 Ste. Catherine St., plans by Yves Belanger, 4065 Melrose Ave., school in Parish of Ste. Monica on Terrebonne Ave. **$360,000.**

▲ **Sask., Regina**—HOUSING—Municipality, City Hall, 100 small housing units. **$1,000,000.** CD 3/17/44.

▲ **Sask., Saskatoon**—HOME FOR AGED—Prov. Govt., Dpt. P. Wks., Regina, home for the aged, in Yorkton or Swift Current areas, **$1,500,000.**

COMMERCIAL BUILDINGS

▲ **Calif., Burbank**—HOTEL—Burbank Hotel Corp., 1541 N. Columbus Ave., Glendale, 100-room hotel, Victory and Buena Vista Blvds. **$1,000,000.**

Calif., Lancaster—DWELLINGS—Vesy & Moore, 170 E. California St., Pasadena, plans by Gordon Foster, 120 E. College St., Covina, 92 frame, stucco dwellings in Tract 20569, **$750,000.**

Ill., Aurora—OFFICE—Aurora Equipment Co., 674 Prairie St., plans by Johnson & Johnson, 111 W. Washington St., Chicago, Zone 2, office. **$400,000.**

▲ **Ill., Chicago**—HOSPITAL—American Hospital Assoc., 18 E. Division St., Zone 10, plans by Schmidt, Garden & Erikson, 104 S. Michigan Ave., Zone 3, hospital, Lake Shore Dr. and Pearson St. **$5,000,000.**

▲ **Ill., Chicago**—HOME OFFICE—Federal Life Insurance Co., 168 N. Michigan Ave., plans by Childs & Smith, 20 N. Wacker Dr., Chicago 6, 2 story, bsmnt., 60,000 sq. ft. HOME OFFICE, Cicero St. north of Peterson Rd. **$1,000,000.**

▲ **Ill., Chicago**—APARTMENTS—Herbert S. Greenwald & Sam Katzin, 135 S. La Salle St., two 27 story, 500-unit apartments, Lake Shore Dr. and Walton Ave. **$15,000,000.**

Ill., Chicago—CHURCH, etc.—St. Marks Methodist Church, 5001 S. Wabash Ave., plans by Edward F. Jansson, 740 N. Wabash St., Zone 11, church, parish hall and Sunday School. **$700,000.**

Ill., Oak Park—NURSES QUARTERS—West Suburban Hospital, 518 N. Austin Ave., plans by Philip Duke West, 33 E. 1 St., Hinsdale, 7 story nurses quarters bldg. addn. **$450,000.**

Ind., Gary—CHURCH—43rd Ave. Presbyterian Church, 110 W. 43 St., plans by Albert F. Heino, 10040 S. Western Ave., Chicago, Ill., church. **$350,000.**

Ind., Noblesville—HOMES—F. C. Tucker Real Estate, 720 Peoples Bank Bldg., Indianapolis, homes, **$300,000** or more.

Ind., South Bend—RESIDENCE HALL—Notre Dame University, South Bend, residence hall. **$800,000.**

Ia., Cedar Rapids—SHOPPING CENTER—Town & Country Shopping Center, 36 and 1 Ave., Cedar Rapids, shopping center, **$400,000.**

Md., Riverdale—BANK—Citizens Bank of Md., 6200 Baltimore Ave., plans by Walton & Maddon, 3510 Rhode Island Ave., Mount Ranier, bank. **$300,000.**

Mass., Gloucester—MOTEL AND YACHT MARINA—Faulk Brothers, Inc., 53 Whittemore St., Gloucester, "Mobotel" combination of motel and yacht marina, Rte. 128 and moving basin in Annisquam River. **$500,000-$700,000,** Robert B. Cutler, 131 State St., Boston, designer.

Mass., Lexington—PROVINCIAL HOUSE—Sisters of Charity, (Grey Nuns of Montreal, Canada), 13 Pelham Rd., plans by Maguolo & Quick, 4507 Harford Rd., Baltimore, Md., 3 story, bsmnt., brick provincial house, Pelham St., **$300,000.**

Mass., Salem—SHOPPING CENTER—Pequot Mills Shopping Center, c/o Harriman, Willis & Hayden, archts., 810 Park Square Bldg., Boston, shopping center, Old Pequot Mill Property, Congress St. **$300,000.**

▲ **Mass., Springfield**—SHOPPING CENTER—Springfield Properties, Inc., 11 Beacon St., Boston, shopping center site of Old Springfield Airport between Liberty St. and St. James Ave. **$5,000,000.** Linenthal & Becker, 16 Lincoln St., Boston, consult. engrs. CD 7/20.

▲ **Mich., Holland** — DORMITORY — Hope College, Dr. Irwin J. Lubbers, pres., Hilland, 4 story, men's dormitory, **$1,000,000.** CD 11/29/50.

▲ **Minn., Brooklyn Center (Minneapolis P.O.)**—SHOPPING CENTER—D. Shanedling, H. Shanedling & Sons Corp., 2025 Nicollet Ave., Minneapolis, plans by S. C. Smiley, 1645 Hennepin Ave., Minneapolis, "Northern Lites" shopping center at Belt Line Hy. 152 (Osseo Rd.) and County Rd. 10 (57 Ave. N.). **$2,000,000.** CD 4/15/54.

▲ **Minn., St. Louis Park**—HOSPITAL—Asbury Hospital, V. Spry, supt., 916 E. 15 St., plans by McEnary & Krafft, 510 McKnight Bldg., Minneapolis, hospital, Excelsior Blvd. East of Minnehaha Creek. **$3,500,000.**

Minn., St. Paul—CHURCH—St. Pius X Catholic Parish, Rev. A. R. Filbin, c/o E. V. Schaefer, archt., 305 New York Bldg., church and school, White Bear Ave. between County Roads E and F. **$335,000.**

Minn., Tracy—SCHOOL—Church of St. Mary, Rev. R. T. O'Connor, pastor, Tracy, plans by Bettenburg, Townsend & Stolte, 1437 Marshall Ave., St. Paul, school and convent. **$300,000.** CD 7/17/52.

Minn., Two Harbors—HOSPITAL—North Shore Memorial Hospital, Inc., Two Harbors, plans by Ellerbe & Co., E. 505 First National Bank Bldg., St. Paul, hospital. **$550,000.**

N. Y., Beechhurst—HOSPITAL—Beechhurst Hospital, 10-01 166 St., plans by Otto J. Sambach, 89-30 161

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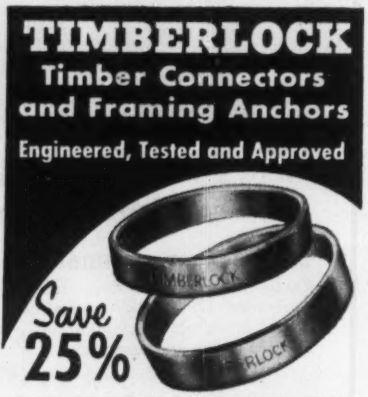
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N. Y., **Brooklyn**—APARTMENT—Harry Kaplan, 233 W. 77 St., New York, Zone 24, plans by Seelig & Finkelstein, 153 Pierrepont St., Zone 2, 6 story apartment, 1350 E. 5 St. **$550,000.**

N. Y., **Brooklyn**—APARTMENT—1900 Management Corp., 80 Lefferts Ave., Zone 25, plans by Lama, Proskauer & Prober, 395 Pearl St., Zone 1, 11 story apartment, 301-22 Beverly Rd. **$910,000.**

▲ N. Y., **New York**—OFFICE—415 Madison Avenue, Inc., S. Rudin, pres., 36 W. 44 St., plans by Emery Roth & Sons, archts., 575 Madison Ave., Zone 22, 24 story office, 415 Madison Ave., **$2,173,160.**

N. Y., **New York**—APARTMENT—Lepas Investors, Inc., 527 Fifth Ave., Zone 17, plans by Lawrence M. Rothman, 147 E. 125 St., Zone 35, 6 story apartment, Bailey Ave. and 229 St. **$550,000.**

▲ N. Y., **New York**—HOSPITAL—New York Foundling Hospital, 175 E. 68 St., Zone 21, foundling hospital, 3rd Ave. from 68 to 69 Sts. **$1,000,000.** CD 5/23/47.

N. Y., **New York**—APARTMENT—Riviera Building Corp., 2198 Grand Concourse, Zone 53, plans by Melvin E. Kessler, 551 Fifth Ave., Zone 17, 9 story apartment, Kappock St. between Independence Ave. and Henry Hudson Parkway. **$975,000.**

O., **Dayton**—STORE—Kroger Co., H. A. Gifford, branch mgr., 321 Hopelond St., 1 story, 20x120 ft. bsmnt., 120x165 ft., brick store, blacktopping parking for 300 cars, on block bounded by West Third St., West Second, Conover and Summit Sts. **$300,000.**

▲ O., **Youngstown**—CATHEDRAL—Catholic Diocese, 514 Chalmers Ave. W., rebuild fire-razed St. Columba Cathedral on same site. **$1,000,000.**

▲ Tex., **Bryan**—DWELLINGS—J. C. Culpepper, Bryan, Phase 1, 38 dwellings, **$379,175**; Phase 2, 26 dwellings, **$300,000**; Phase 3, 36 dwellings, **$368,075**; Phase 4, 41 dwellings, **$395,000**; Phase 5, 30 dwellings, **$319,500**; Phase 6, 29 dwellings, **$310,000** in 300-acre tract off Texas Ave. and Hy. 6.

Tex., **Dallas**—DWELLINGS—Gump & Gaynier, 8418 Preston Dr., 23 all-masonry dwellings, various location. **$338,500.**

▲ Tex., **Duncanville**—DWELLINGS—T. K. Irwin, Sr., c/o Irwin-Keasler Bldg. Dallas (A) high all-masonry type dwellings, **$325,000** (B) 16 all-masonry dwellings, **$339,500** (C) 8 all-masonry dwellings, **$345,075** (D) 26 frame and masonry dwellings, **$390,150** (E) 12 brick, stone dwellings, **$300,000** (F) 22 misc. type dwellings, **$375,000** (G) 18 masonry dwellings, **$351,190.**

Tex., **Garland**—DWELLINGS—M. C. Cole, 6238 Parkdale St., Dallas, 32 frame dwellings, concrete slab on fill, **$335,000**; 25 masonry dwellings, **$319,500**, in Monica Park Subdivision, off Belt Line Rd.

Tex., **Houston**—SHOPPING CENTER—C. O. Beeler and W. Edward Brown, 4717 Calhoun St., plans by Joseph B. Reynolds, 2480 Times St., 65x600 ft. brick, concrete shopping center, Bearle and Delta Sts. in Red Bluff Terrace, 2½ acre tract. **$500,000.**

▲ Tex., **Houston**—DWELLINGS—Clark W. Henry & Assocs., 2054 Richmond St., plans by Don & Chris. Robinson, 2436 South Blvd., 19 dwellings, **$344,175**; 22 dwellings, **$338,160**; 16 dwellings, **$305,000**; 24 dwellings, **$358,500.** CD 8/4.

▲ Tex., **Houston** — DWELLINGS — Jersey Village Corp., 2054 Richmond St., plans by Chris & Don Robinson, 2436 South Blvd., 22 frame, masonry dwellings, **$345,600**; 15 all-masonry dwellings, **$327,075**; 19 masonry dwellings, **$336,150**, in area of Jersey Village.

▲ Tex., **Hurst**—DWELLINGS—Centex Constr. Co., 4911 Greenville St., Dallas, 22 frame, brick dwellings, **$335,000**; 34 frame, masonry dwellings, **$347,120**; 38 frame dwellings, **$365,000.**

Tex., **San Antonio**—DWELLINGS—M. C. Engel, 1016 W. Laurel St., 10 all-masonry dwellings, **$300,000**; 19 dwellings, **$325,000**; 24 misc. type dwellings, **$388,175** in Roy Pletz Sunshine Ranch Tract.

Tex., **San Antonio**—BANK—Dan S. Harris, Trustee, c/o Ralph H. Cameron, Transit Tower Bldg., remodeling 3 story old Lockwood Bank Bldg. at 115 Broadway and addn. of 3 more stories. **$300,000.**

▲ Tex., **San Antonio**—APARTMENT HOTEL—Norman M. Lowery, 218 Grotto St., plans by DeHaven Pitts, 4600 Broadway, 8 story 280 unit apartment-hotel, stores on 1st floor, incl. penthouse and swimming pool on roof, cabana club and swimming pool on ground floor, Jackson-Keller Rd. and San Pedro Ave. **$3,000,000.** Mackie & Kamrath, 2713 Ferndale St., Houston, consult. archts. CD 6/24/53.

Tex., **San Antonio**—CHAPEL—Oblate Seminary, 1900 McCullough Ave., Plans by Julian & White, 2901 Transit Tower, chapel, **$300,000.** CD 8/11.

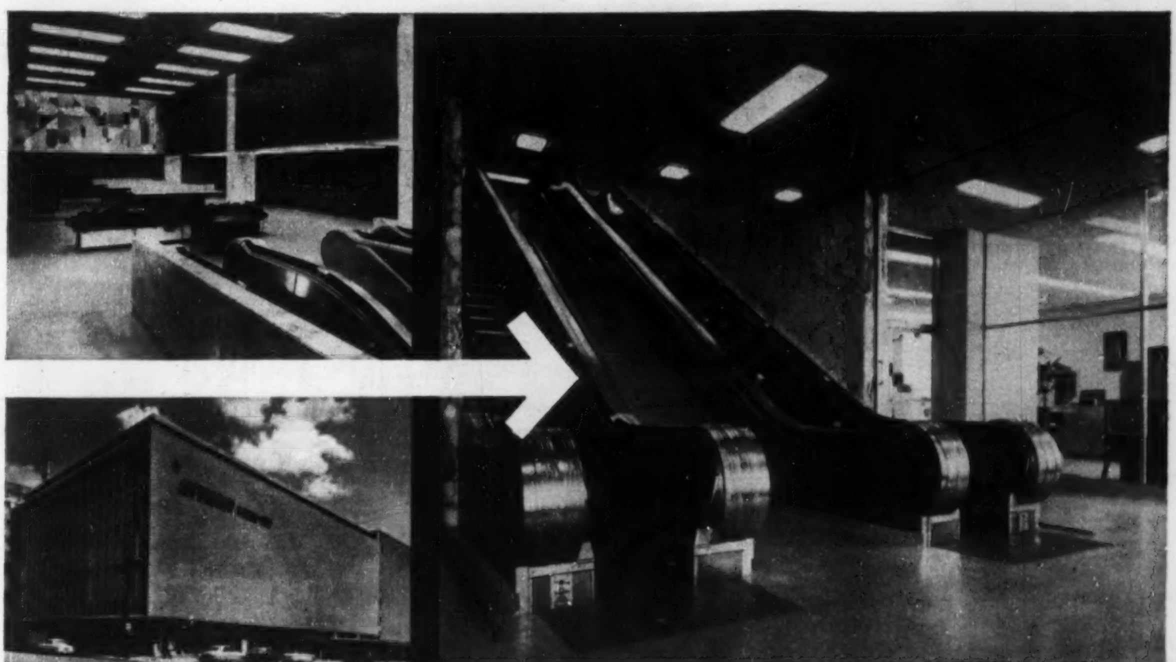
Tex., **San Antonio**—DWELLINGS—Robert Ross, Builder, 1360 W. Poplar St., 8 all-masonry dwellings, **$310,000**; 16 masonry, frame dwellings, **$329,100**; 11 brick-stone dwellings, **$333,500**, in Roy Pletz Sunshine Ranch Tract.

▲ Va., **Richmond** — RESIDENCES, etc. — Central Land Corp., 715 W. Grace St., residential development, shopping center, parking area on Mechanicsville Pike at former Central Airport. **$6,000,000.**

W. Va., **Wheeling**—TELEPHONE—Chesapeake & Potomac Telephone Co. of W. Va., 816 Lee St., Charleston, 3 story, bsmnt., 76x102 ft. telephone bldg. addn., alterations. **$603,000.** John Jay, c/o owner, engr. CD 2/19/53.

▲ Wis., **Glendale**—SHOPPING CENTER—Sheldon-Thomas Co., 5850 N. Pt. Washington Rd., plans by M. O. Nathan, 343 S. Dearborn St., Chicago, Ill. and Lefebvre & Wiggins, 810 E. Center St., Milwaukee, Bay Shore Shopping Center Addn., incl. 3 buildings, **$3,000,000.**

(Continued on page 352)



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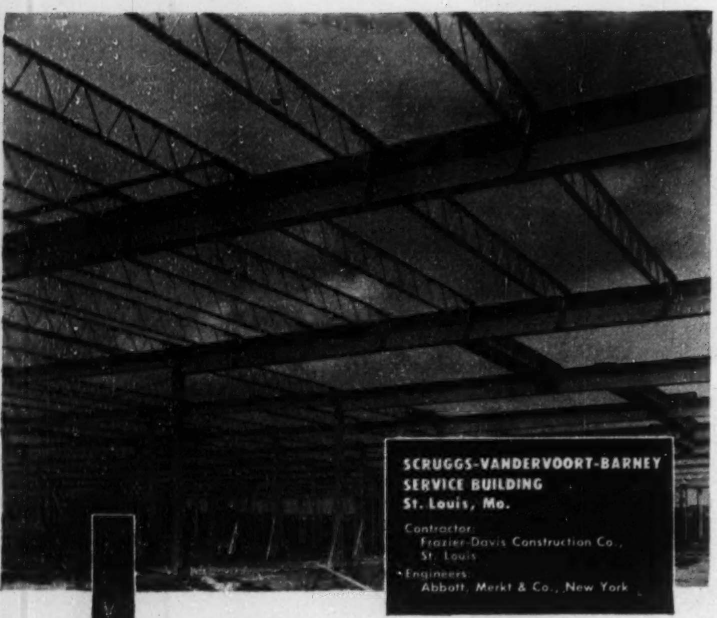
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(Continued from page 350)

Wis., Milwaukee—NURSES HOME—Columbia Hospital, 33321 N. Maryland Ave., plans by Schmidt, Garden & Erikson, 104 S. Michigan Ave., Chicago, Ill., nurses' home addn. **$600,000-$700,000.** CD 10/29/52.

▲ **Wis., Milwaukee**—HOUSING—Custom Builders, Inc., 5310 N. 25 St., plans by Steinhagen & Steinhagen, 2735 W. State St., housing incl. about 321 homes. **$6,000,000.**

Ont., Toronto—APARTMENT—Colony Investments Ltd., 3845 Bathurst St., plans by E. I. Richmond, 455 Spadina Ave., 75 suite, irregular shaped, 3 story, bsmnt., 138x141 ft., concrete block, steel, brick apartment, 56 Ranleigh Ave. **$500,000.** Alex Tobias, 24 Cecil St., consult. engr.

Ont., Toronto — APARTMENTS — Squigna-Martini Contractors, 2570 Eglinton Ave. W., 5 3½ story, brick, concrete block 55-suite apartments, Keele St. and Maple Leaf Dr. **$400,000.** Structural Eng. Co., 2564 Eglinton Ave. W., consult. engr.

▲ **Que., Montreal**—OFFICE—Les Syndicate Nationalaux de Montreal, Inc., 1231 Demontigny St. E., plans by Y. Belanger, 4065 Melrose Ave., 10 story, 80x180 ft. office, Dorchester St. W. between Benoit and St. Georges Sts. **$1,500,000.**

INDUSTRIAL BUILDINGS

▲ **Ariz., Phoenix**—REFINERY—Navajo Refiners, Albuquerque, N. M., Arizona Refineries Co., Phoenix, Ariz., and Ar-Mex Pipe Line Co., Phoenix, Ariz., 10,000-bbl. daily capacity refinery. **$4,000,000.** Ebasco Services, Inc., 2 Rector St., New York, N. Y., consult. engr. CD 9/14.

▲ **Ark., Little Rock**—WAREHOUSE—The Kroger Co., 1240 State St., Cincinnati, O., 160,000 sq. ft. general foods warehouse, **$1,000,000.**

Calif., Long Beach—WAREHOUSE—Drown News Agency, 1247 W. 1 St., plans by Roy Donley, 8810 Melrose Ave., Los Angeles, warehouse. **$100,000.**

Conn., East Hartford—WAREHOUSE—Hartford Dispatch & Warehouse Co., Inc., 410 Capitol Ave., Hartford, plans by Adolph Feinberg, 1129 Main St., Hartford, 1 story, 90x150 ft. warehouse, 225 Prospect St. **$150,000.**

Ill., Chicago—SUB-STATION—Commonwealth Edison Co., 72 W. Adams St., Zone 3, sub-station, Grand and Narragansett Sts. **$125,000.**

Ind., Indianapolis—FACTORY, etc.—Geiger & Pet[illegible]s, Inc., 1709 Madison St., factory, warehouse and offices, Sherman St. along Pennsylvania R.R., **$200,000.**

▲ **Ind., Indianapolis**—WAREHOUSE—Ginn & Co., 72 Fifth Ave., New York, N. Y., warehouse, 31 and Shadeland Aves. **$1,000,000.**

Ia., Alexandria—PLANT—Alexandria Town Talk, Alexandria, plans by Donald R. Goss, 519 Chadbourne Bldg., San Angelo, Tex., newspaper plant, **$250,000.**

Ia., Cedar Rapids—PLANT—Darling & Co., 4202 Ashland St., Chicago, Ill., fertilizer plant. **$500,000.**

Kan., Wichita—TERMINAL—Continental Oil Co. & Cities Service Oil Co., Ponca City, Okla., pipe line terminal. **$750,000.**

Md., Baltimore—PLANT—National Gypsum Co., 2301 S. Newkirk St., mfg. plant addn., Canton area, **$500,000.**

▲ **N. M., Albuquerque**—REFINERY—Navajo Refineries, Albuquerque, N. M., Arizona Refineries, Phoenix, Ariz. and Ar-Mex Pipe Line Co., Phoenix, Ariz., Jack Frost, pres., Albuquerque, N. M. 10,000-bbl. daily capacity refinery. **$4,000,000.** Ebasco Services, Inc., 2 Rector St., New York, N. Y., consult. engr. CD 9/14.

N. Y., Brooklyn—GARAGE—Eureka Realty Corp., 1929 65 St., Zone 19, plans by M. Martin Elkind, 74-09 37 Ave., Jackson Heights, 1 story garage, 152-166 Third St. **$150,000.**

▲ **O., Ashtabula**—PLANT—Electro-Metallurgical Co., 30 E. 42 St., New York 17, N. Y., titanium plant to produce 7,500 tons yearly. **$31,560,000.** Catalytic Constr. Co., 1528 Walnut St., Phila. 2, Pa., engr. CD 6/29.

O., Columbus—STORAGE—Arrow Grain Elevator Co., 1915 E. Main St., concrete grain storage bldg. **$500,000.**

O., Columbus—ASSEMBLY—Belmont Casket Co., 330 W. Spring St., concrete block, brick assembly bldg. **$100,000.**

O., Columbus—PLANT, OFFICE—Robinson-Houchin Co., 78 Thurman Ave., mfg. plant and office along east side of Dublin Rd. **$250,000.**

▲ **Pa., Gallitzin**—FACTORY—Publix Shirt Corp., 75 Lenard St., New York, N. Y., 20,000 sq. ft. shirt factory addn. **$100,000.**

Pa., Masontown — MANUFACTURING — Gateway Mfg. Corp., Masontown, plans by J. C. Fulton & Son, Second Natl. Bank Bldg., Uniontown, 2 story, 78x117 ft. brick, block shirt mfg. bldg. addn. **$100,000.**

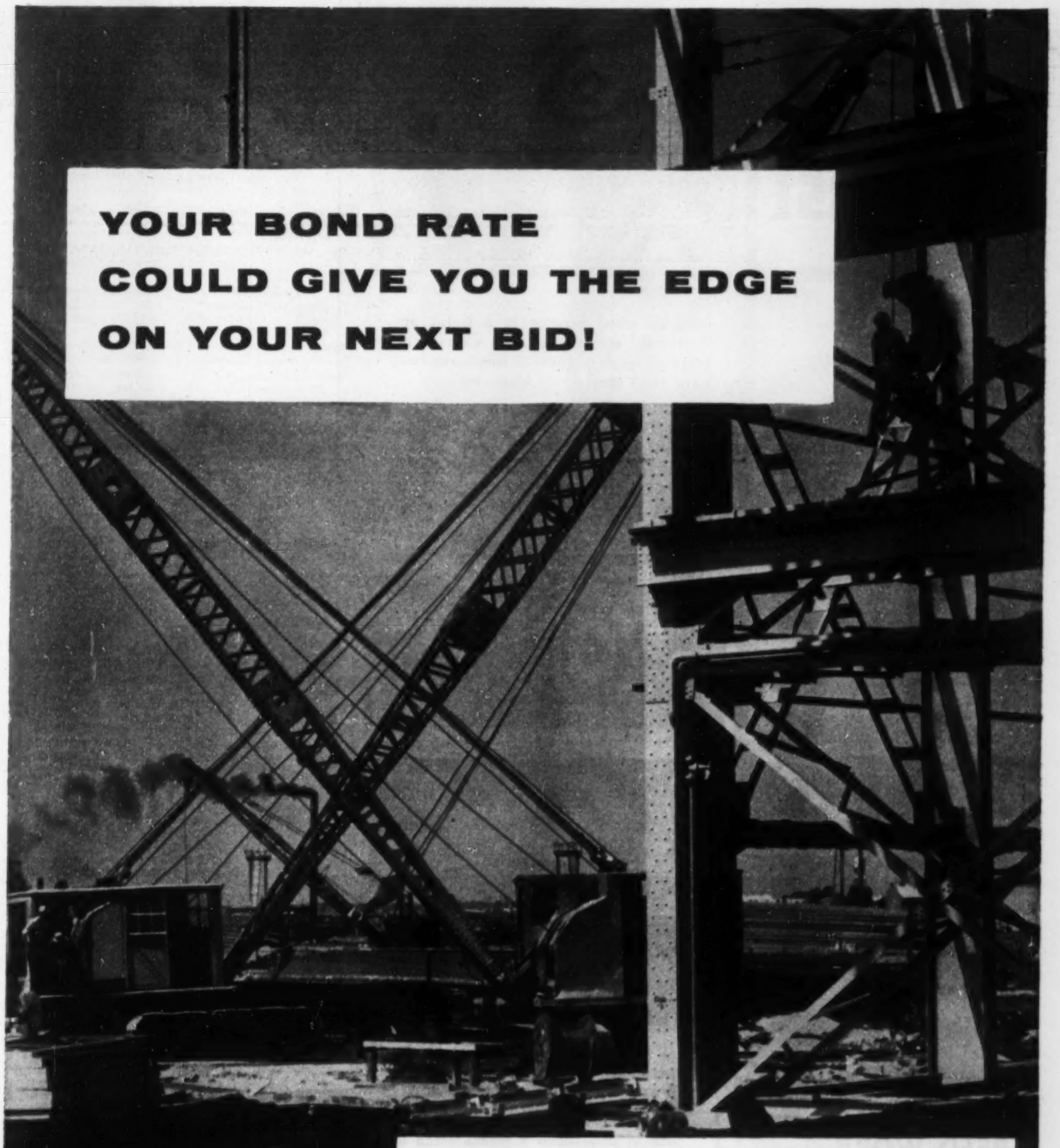
Tex., Dallas—PLANT—Upjohn Co., Kalamazoo, Mich. plans by The Austin Co., engr.-archt., 510 N. Dearborn St., Chicago 10, Ill., 1 story, masonry, 35,000 sq. ft. pharmaceutical plant, **$400,000.**

Tex., Henderson—PLANT—Henderson Clay Products Co., Henderson, plant expansion to double existing capacity of 60,000 bricks daily. **$500,000.**

Tex., Irving—WAREHOUSING—Sun Oil Co., Rio Grande Bldg., Dallas, Unit 1, warehousing, **$175,000;** Unit 2, warehousing, **$225,000;** new testing laboratory units, **$275,000.**

▲ **Va., Glen Lyn**—GENERATING UNIT—Appalachian Electric Power Co., 40 Franklin Rd., Roanoke, 225,-

(Continued on page 354)



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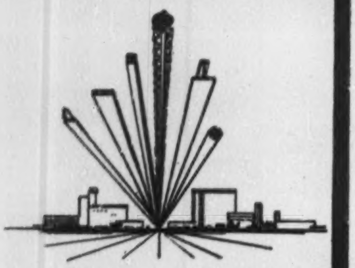

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CLAM SHELL • ELECTRIC • ORANGE PEEL • GRAPPLES
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(Continued from page 352)

000 KW. steam-electric generating unit addn. to existing plant on New River. $26,400,000.

Wash., Seattle—WAREHOUSE—Great Northern Ry. Co., R. R. Manion, ch. engr., 175 E. 4 St., St. Paul 1, Minn., plans by J. W. Hayes, c/o owner's local office, King St. Station, Seattle, 50x144 ft., masonry freight warehouse addn. **$135,000.**

▲ **Alta., Edmonton**—POWER PLANT—Canadian Utilities Ltd., 10529 Jasper Ave., steam power plant and two transmission lines. **$5,000,000.**

B. C., Chilliwack—CEMENT PLANT—International Cement Corp., 2325 Chestnut St., Dallas, Tex., U. S. A., cement plant east of Popcum Indian Reserve. **$500,000.**

▲ **Ont., Hamilton**—STRIP MILL—The Steel Co. of Canada Ltd., Wilcox St., galvanized strip mill. **$2,500,000.**

Ont., Hemlo—PLANT—Geco Mines Ltd., 44 W. King St., Toronto, processing plant at Lake Manitouwadge. **$500,000.**

Ont., Toronto—FACTORY—Canadian Wirebound Boxes Ltd., 1000 Gerrard St. East, plans by R. W. Sheriff, 3 Macauley Ave., 1 story, brick, steel factory addn. **$300,000.**

Que., Amos—ABATTOIR—Catholic Farmers Union of Amos, Amps, abattoir in Abittibi area. **$400,000.**

Que., Sherbrooke—GARAGE, etc.—Bell Telephone Co., 1050 Beaver Hall Hill, Montreal, concrete, brick garage and warehouse. **$350,000.**

UNCLASSIFIED

Colorado—RURAL DISTRIBUTION LINES—**Poudre Valley** Rural Electric Assoc., Inc., Fort Collins, sub-station facilities and sys. imprvs. **$130,000.** CD 6/18/52.

▲ **Ind., Anderson**—COLISEUM—City, Noland Wright, mayor, City Hall, city coliseum between Madison Ave. and New York Central R.R. **$1,000,000.**

Ia., Council Bluffs—SWIMMING POOL—City, defeated **$125,000** bonds, swimming pool. CD 8/20.

▲† **Mass., Boston**—MARGINAL PIER—First Naval Dist., 495 Summer St., Boston, reconstr. marginal Pier No. 11, Naval Shipyard, Charlestown, NOY 85204, Spec. 43308, **$1,000,000.** Hayden, Harding & Buchanan, 31 St. James Ave., Boston, consult. engrs.

Mississippi—RURAL DISTRIBUTION LINES—Magnolia Electric Power Assoc., McComb, 150 mi. rural distr. lines, sys. imprvs., Pike Co. **$450,000.**

Montana—OIL LINE—Shell Pipe Line Corp., c/o T. E. Swigart, pres., Shell Bldg., Houston, Tex., 35 mi. 12 in. crude oil line between Glendive and Cabin Creek Field via Pine Unit Field, Glendive. **$550,000.**

▲ **New Mexico, Colorado, Wyoming**—OIL PIPE LINE—Navajo Refineries, Albuquerque, N. M., Arizona Refineries, Phoenix, Ariz. and Ar-Mex Pipe Line Co., Phoenix, Ariz., Jack Frost, pres., Albuquerque, N. M. crude oil pipe line running from near Guernsey, Wyo. through Colorado and to Albuquerque, N. M. **$30,000,000.** Ebasco Services, Inc., 2 Rector St., New York, N. Y., consult. engr. CD 9/14.

N. Y., Far Rockaway—COMFORT STATION, etc.—Park Dpt., Arsenal Bldg., New York, plans by Brown & Blauvelt, 468 Fourth Ave., New York, Zone 16, comfort station and playground, Grassmere Terrace, southwest corner of Brookhaven Ave. **$121,000.**

O., Deer Park—UTILITIES—Dillons, Inc., Losantiville Ave. and Penn R. R., Cincinnati, approx. 4,000 lin. ft. of paving, sewer and water lines on exten. of Mantell Ave. and new streets. **$180,000.** Nunlist & Frolicher, Traction Bldg., Cincinnati, consult. engrs.

▲ **Oklahoma-Kansas**—FUEL and GASOLINE PIPE LINE—Cherokee Pipe Line Co., subsidiary of (just formed) Continental Oil Co. and Cities Service Oil Co., Ponca City, Okla. 83 mi. jet fuel and gasoline line from Ponca City to Wichita, Kan.; 75 mi. of an existing line purchased to be converted to gasoline and jet fuel sys. between Ponca City and Wichita, 8 mi. new line to complete the sys. **$2,000,000.**

Okla., Anadarko—ELECTRIC DISTR. SYS.—City, rebuild electric distr. sys. **$100,000.** C. H. Guernsey & Co., 2701 N. Oklahoma St., Oklahoma City, consult. engrs. CD 1/5.

Okla., Cushing—ENGINE GENERATOR—City, Cushing, addnl. engine generator unit for City Light Plant. **$500,000.** C. H. Guernsey & Co., 2701 N. Oklahoma St., Oklahoma City, consult. engrs.

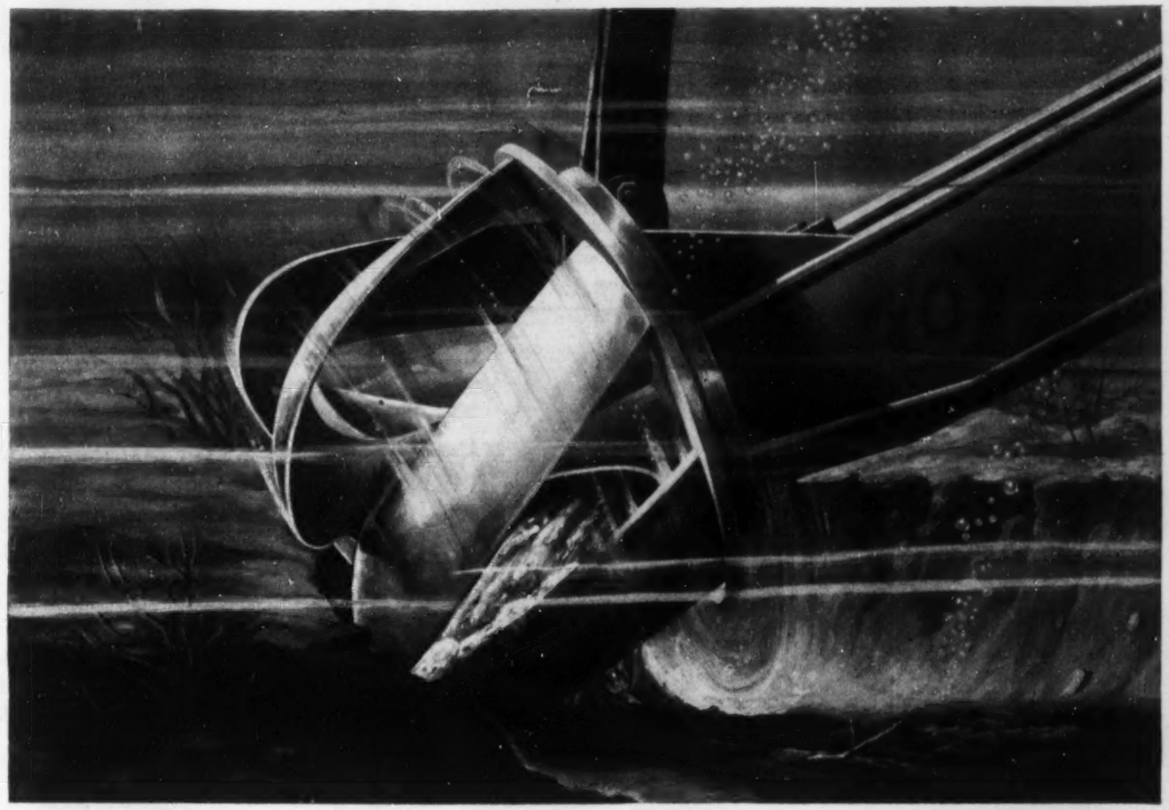
Tex., Dallas—LIGHTING—City, City Hall, Main and Harwood Sts., providing 290 mercury vapor street lights on 7 residential streets, **$78,500;** providing sects. of Central Expressway with mercury-vapor lighting, **$110,000;** five installations involving several hundred mercury vapor street lighting, **$190,500;** addnl. powerful mercury vapor lighting on three major streets, Mockingbird Lane, Haskell and Lancaster Sts., **$75,000.** J. G. Rollins, P. Wks. Engr.

Tex., Houston—GAS SYS., ELECTRIC SYS.—Syndicate (Houston Business Men), c/o C. M. Hudspeth, trustee, Guaranty Bldg. natural gas distributing sys. **$65,000;** outdoor electrical lighting sys. **$70,000,** for 510-acre tract on Bammel-Westfield Rds., near here.

Tex., Texas City—STADIUM—City, stadium. **$100,000,** B. J. Rodhaus & H. L. Ingram, Beaumont, consult. engrs. CD 4/22.

Wash., Bellingham—ATHLETIC FIELD, etc.—School District 501, Bellingham, bond election Nov. 2, athletic field and grandstand. **$500,000.** CD 1/4.

Wash., Renton—SWIMMING POOL—City, City Hall, defeated bonds, swimming pool. **$100,000.** CD 7/29.



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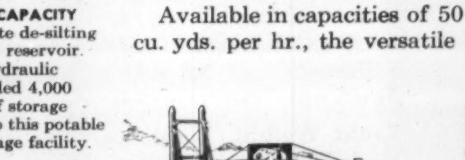

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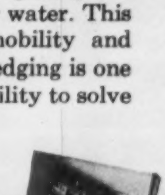

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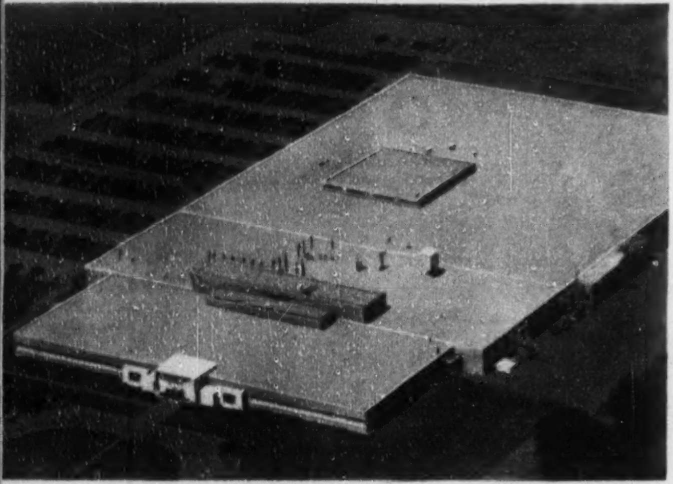

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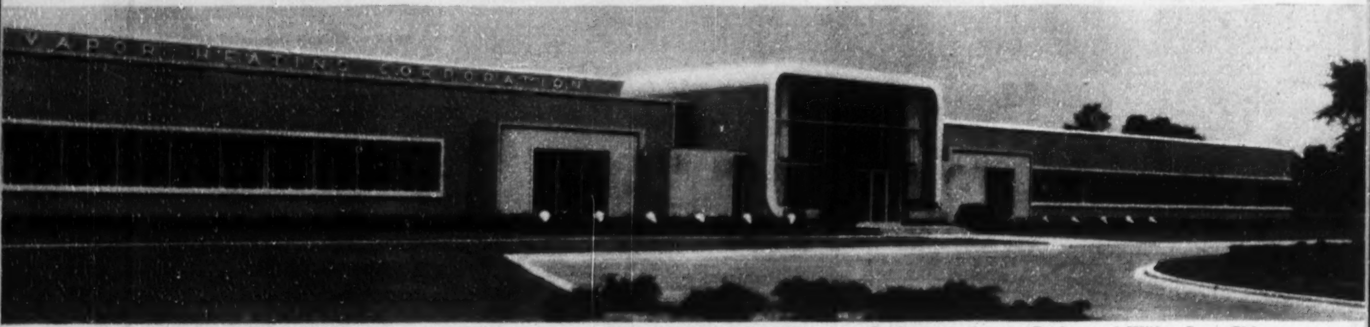
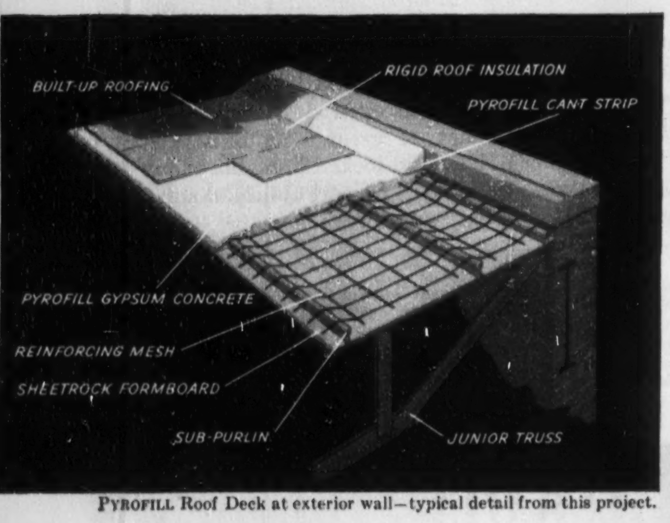


Vapor Heating Corp., Niles, Ill. (220,000 sq. ft. of PYROFILL poured gypsum roof deck) Architects: Graham, Anderson, Probst and White, Inc., Chicago
General Contractor: A. L. Jackson Company, Chicago, Illinois • PYROFILL Contractor: Hoge-Warren-Zimmermann Co., Chicago, Illinois



PYROFILL Roof Deck at exterior wall—typical detail from this project.

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Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

BIDS ASKED—HEAVY CONSTRUCTION

Mass., North Attleboro—BA 10/11—Town, Bd. Water Comrs., Water Dpt., large diameter wells, $34,000. Plans deposit $10 refundable. Whitman & Howard, 89 Broad St., Boston, engrs. CD 8/17.

† **R. I., Davisville**—BA 10/12—P. Wks. Office, First Naval Dist., 495 Summer St., Boston, Mass., grading, paving at bulkhead, U. S. Naval Construction Battalion Center, NOY 85300, Spec. 43341 (SF). CD 9/12/52, under Public Buildings.

† **Mass., Hingham**—EXHAUST SYSTEM—BA 10/13—Dist. P. Wks. Office, IND, 495 Summer St., Boston 10, Mass., exhaust sys., Bldg. 116, U. S. Naval Ammunition Depot, NOY 85270, Spec. 43313 (SF). Plans deposit $10.

Mass., Boston and Dedham—BA 10/14—State, Metropolitan Dist. Comn., Water Div., 20 Somerset St., Boston, Contr. 208 ,furnish, lay. 11,700 ft. 36 and 48 in. steel or rein.-con. water lines $280,000. Plans deposit $5 refundable. CD 5/12/44.

† **Mass., Falmouth**—FLIGHT SIMULATOR BLDG.—BA 10/14—U. S. Eng., 857 Commonwealth Ave., Boston, flight simulator bldg., Otis Air Force Base, ENG-19-016-55-24, $50,000-$100,000. Plans deposit $5 refundable. Lloyd M. Hendrick, Main St., Buzzards Bay, archt. CD 9/16.

† **R. I., Davisville**—BA 10/14—P. Wks. Office, First Naval Dist., 495 Summer St., Boston, Mass., replacing water tanks, Naval Construction Battalion Center, NOY 85291, Spec. 43332. Plans deposit $10. CD 9/12/52, under Public Buildings.

Mass., Boston—STATION—BA 10/18—State, Metropolitan Transit Auth., Park Square Bldg., Metropolitan Transit Auth., Station, Leverett Circle Science Park Station, Cambridge, $80,000. Plans deposit $25 refundable.

BIDS ASKED—BUILDINGS

Conn., Waterbury—SCHOOL—BA 10/13—City Bd. Educ., Crosby High School, 271 E. Main St. Bunker Hill School addns., alterations, Bunker Hill. $300,000. Plans deposit $35. Louis R. Fucito, 141 South Elm St., archt. CD 3/29.

Vt., Chester—SCHOOL—BA 10/19—Town, John Battice, chn. School Bd., c/o Supt. Schools, Grade School Bldg., Chester, heating, plumbing, ventilating and electric elementary school. Approx. $300,000. Plans deposit $20. Alfred T. Granger Assocs., Granger Circle, Hanover, N. H., archts. CD 1/13.

Conn., Plainville—SCHOOL—BA 10/21—Bd. Educ., 2 story, high school, East St. Plans deposit $50. William J. Prevoost, 421 Main St., Stamford, archt. Paul Harrigan, 909 Whalley Ave., New Haven, mech. engr. Seelye Stevenson, 101 Park Ave., New York, N. Y., structural engr. CD 12/24.

▲ **Mass., New Bedford**—SCHOOL—BA 10/21—City, 166 Williams St., Central Junior High School, east of Sargent Field, $2,000,000. Plans deposit $100 refundable, William Nelson Jacobs, 438 Park Square Bldg., Boston, archts. CD 6/28.

SOON LETS CONTRACT—BUILDINGS

▲ **Mass., Boston**—LABORATORY—Massachusetts General Hospital, Fruit St., soon lets contract, pathology and bacteriology laboratory, Allen St. $1,260,000. Shepley, Bulfinch Richardson & Abbott 1 Court St., Boston, archts. CD 9/8.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

† **Edward R. Marden Corp.**, 233 Harvard St., Brookline, Mass. LB **$450,000**, est. $200,000-$400,000. facilities Bucks Harbor, ENG-19-016-55-22, Machiasport, MAINE. U. S. Eng., 857 Commonwealth Ave., Boston, Mass. Bids Sept. 24. CD 9/14.

MASSACHUSETTS — Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,
Kelleher Corp., Turners Falls, Mass. CA **$595,283**, est. $600,000. hy. constr. Rte. 2, F185 (4), Buckland-Shelburne. CD 9/20, under LB.

B. & M. Constr. Co., 30 Lawrence Plain Rd., Hadley, Mass. LB **$49,850**, est. $63,000. imprv. Assabet River, Northboro and Westboro, MASSACHUSETTS. Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston, Mass. Bids Sept. 21. CD 9/13.

▲ **MASSACHUSETTS**—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,
S. & M. Constr. Co., 30 Salmon St., Providence, R. I. CA **$3,191,828**, est. $3,000,000. hy. and bridge, Athol and Phillipston.
Berke-Moore Co., Inc., 8 Newbury St., Boston, Mass. CA **$3,897,264**, est. $4,900,000. Sect. 1 Contr. 1 Northeast Expressway Mystic River Bridge to Maple, Chelsea. CD 9/17, under LB.

† **Petricca Constr. Co.**, 534 West St., Pittsfield, Mass. LB **$390,269**, est. $300,000-$400,000. Adams flood control Hoosic River Basin, Adams, ENG-19-016-55-10, MASSACHUSETTS. U. S. Eng., 857 Commonwealth Ave., Boston, Mass. Bids Sept. 21. CD 8/27.

Centriline Corp., 104 Cedar St., New York, N. Y. LB **$56,745**, est. $60,000. cleaning, lining water mains, CAMBRIDGE, MASS. City, Purch Agt., City Hall, Cambridge, Mass.

BUILDINGS

LOW BIDS AND CONTRACTS

Brown Constr. Co., 562 Congress St., Portland, Me. LB **$304,075**, est. $330,000. men's DORMITORY, State Teachers College, GORHAM, ME. State, Dpt. Educ. , State House, Augusta, Me. Stevens & Saunders, 187 Middle St., Portland, Me., archts. CD 12/18/52.

J. R. Partridge Constr. Co., 123 Western Ave., Augusta, Me. LB **$392,429**, Scheme A;
Stewart & Williams, Inc., 108 Arsenal St., Augusta, Me. LB **$418,000**. Scheme B, liquor WAREHOUSE, Hallowell Muster Field, HALLOWELL, ME. State Liquor Comn., Weston St., Augusta(, Me. Bids Sept. 22. CD 9/21.

† **John Bowen Co., Inc.**, 173 Boston St., Dorchester, Mass. LB **$236,410**. est. $200,000. constr. tent slabs and officers MESS HALLS, ENG-19-016-55-18, WELLFLEET, MASS. U. S. Eng., 857 Commonwealth Ave., Boston, Mass. CD 8/20.

▲ **Tornabene Bros. Co.**, 170 Needham St., Newton Upper Falls, Mass. CA **$2,125,000**. HIGH SCHOOL, Piper St., WEST SPRINGFIELD, MASS. Town, High School Bldg., Town Hall, West Springfield, Mass. CD 9/22.

R. A. Civitello Co., 607 Sherman Ave., New Haven, Conn., LB, **$300,000**, Elementary SCHOOLS, Pine Orchard, Hotchkiss Grove Area, Branford Mills, BRANFORD, CONN. Town Bd. Educ., High School, Branford, Conn. Bids Sept. 17. CD 9/1.

John F. Corcoran Co., 130 Washington St., Hartford, Conn., LB, **$388,700**; Alt. Bid 1, Minus **$62,200**; Alter. 2, Minus **$10,700**. Proj. B/AO-1-119 FOOD SERVICE alterations, State Hospital, MIDDLETOWN, CONN. State, Ralph G. Macy, state hy. comr., State Office Bldg., Hartford, Conn. Jerome F. Mueller, 15 Lewis St., Hartford, Conn., engr. Gordon MacMaster, 151 Cout St., New Haven, archt. CD 2/7/49.

City, Bd. Educ., 151 Broad St., Stamford, Conn., rejected bids Sept. 9, Katherine T. Murphy SCHOOL addns., alterations, Horton St., STAMFORD, CONN. LB **$586,000**. Will re-advertise. CD 9/17, under LB.

MIDDLE ATLANTIC

BIDS ASKED—HEAVY CONSTRUCTION

† **N. J., Oceanville**—REFUGE—BA 10/11—Regional Directors, Fish & Wildlife Service, 59 Temple Pl., Boston 11, Mass. Brigantine National Wildlife Refuge, Inv. FW 5-1998. Extended date. CD 9/7.

† **Md., Annapolis**—GASOLINE STATION—BA 10/14—Officer in Charge of Constr.., U. S. Naval Academy, Annapolis, gasoline station, Navy Exchange, U. S. Naval Station, NOY 84697, Spec. 44164. Plans deposit $10. CD 11/17/47.

PENNSYLVANIA — BA 10/14 — Pennsylvania Turnpike Comm., 11 N. Fourth St., Harrisburg,
Lehigh Co.—constr. 4.1 mi. Sect. 35-H, of Northeastern Exten. of Turnpike in Lower Milford and Upper Milford Twps., Emmaus Boro and Lower Macungie Twp. CD 10/28.

NEW YORK—BA 10/20—Triborough Bridge & Tunnel Auth., Administration Bldg., Randall's Island, New York,
Queens Co.—Contr. QME-8, constr. Queens-Midtown Expressway, Maurice Ave. to 80th St. Plans deposit $20. Andrews, Clark & Buckley, 305 E. 63 St., New York, Zone 21, consult. engrs. CD 10/13/52.

† **N. Y., Newburgh**—FACILITIES—BA 11/3—U. S. Eng., 80 Lafayette St., New York, Zone 13, misc. facilities (FYY-55), Stewart Air Force Base, Serial No. ENG-30-075-55-56. $400,000-$600,000. Plans deposit $25. CD 2/26.

▲† **N. Y., Brooklyn**—ELECTRICAL DISTR. SYS.—BA 11/18—U. S. Eng., 80 Lafayette St., New York Zone 13, modernization electrical distr. sys., Brooklyn Army Base, Serial No. ENG-30-075-55-16. $1,000,000-$1,250,000. Plans deposit $100.

† **Conrad Hanson & Co.**, Bethesda, Md. LB, **$454,158**. Site BA-31-C1 special AAA battery site, near Fairlee, ENG-18-020-55-11, Kent Co., MARYLAND. U. S. Eng., 24 St. and Maryland Ave., Baltimore, Md. Bids Sept. 24. CD 8/14.

BIDS ASKED—BUILDINGS

▲ **Pa., Selinsgrove**—SCHOOL EXPANSION—BA 10/27—General State Auth., 18 and Herr Sts., Harrisburg, Selinsgrove State School expansion. $7,000,000. separate bids for general constr., heating, plumbing, electrical and individual and group bids. Plans deposit $100 each contract. Clayton J. Lappley, Riverview Manor, Harrisburg, archt. H. F. Lenz, 227 Franklin St., Johnstown, engr.

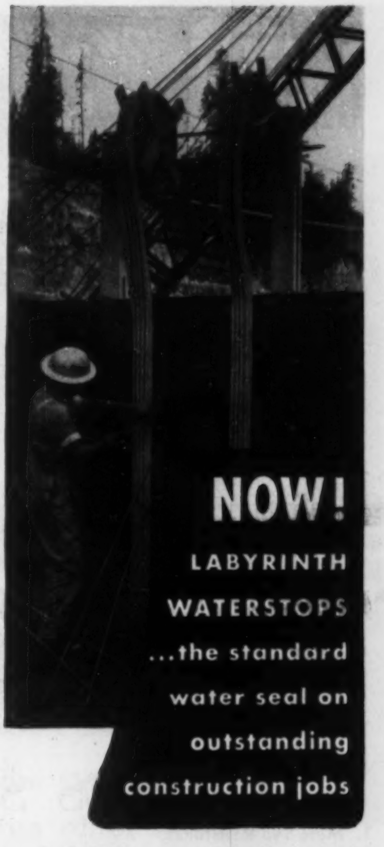
HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

Jones Beach State Parkway Auth., Belmont Lake State Park, Babylon, N. Y., cancelled bids to have been opened Oct. 5, water supply imprvs., constr. and developing well near Station 350, Wantagh State Parkway, Wantagh, Nassau Co., NEW YORK. CD 9/24.

† **U. S. Eng.**, 80 Lafayette St., New York 13, N. Y. cancelled bids to have been opened Oct. 21, Catskill Aqueduct Bridging, clear and approach zone, Stewart Air Force, Serial No. ENG-30-075-55-83. NEWBURGH, N. Y. **$500,000-$1,000,000**. CD 9/21.

MARYLAND—State Rds. Comn., 108 E. Lexington St., Baltimore, Zone 2,
Empire Constr. Co., 31 S. Calvert St., Baltimore 2, Md. LB **$227,825**. dual 3 span steel plate girder and I-beam bridges to carry Glen Burnie By Pass over New



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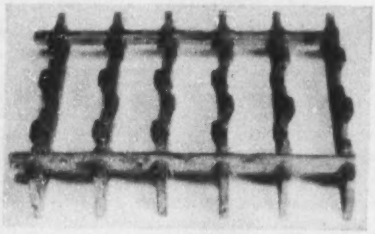

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Cut Rd., Contr. AA 473-9-520, Anne Arundel Co. Bids Sept. 21. CD 9/9.

▲ **MARYLAND**—State Rds. Comn., 108 E. Lexington St., Baltimore, Zone 2,

Nello L. Teer Co., Durham, N. C. LB **$1,133,522**. grading, drainage, surf. 4.523 mi. dual hy., Contr. M-531-1-320, Montgomery Co.;

A. H. Smith, Branchville, Md. LB **$166,545**. surf., resurf. 6.508 mi. State Rte. 2, Contr. C 194-3-520, Calvert Co. Bids Sept. 21. CD 9/9.

† **M. Cain Co., Inc.**, 3315 8 St. N. E., Wash., D. C., LB, **$67,380**, sanitary sewerage sys. alterations, AAA sites 13 and 14, WASH., D. C. U. S. Eng., First and Douglas Sts. N. W., Wash. 25, D. C. Bids Sept. 23. CD 9/13.

Curtin & Johnson, 1116 "W" St. N. E., Wash., D. C., LB, **$117,508**, paving roadway of Atlantic St. S. E. from S. Capitol to 4 Sts., WASH., D. C. D. C. Govt. Dpt. Hys., 499 Pa. Ave. N. W., Wash., D. C. Bids Sept. 23. CD 9/17.

BUILDINGS

LOW BIDS AND CONTRACTS

Bayport Shores Homes, c/o Henry A. Klar Realty Co., 220-02 Horace Harding Blvd., Bayside Hills, N. Y. Owner Builds. **$790,000**. 72 HOUSES, Middle Rd. and Edgewater Ave., BAYPORT, N. Y.

▲ **Oakfield Gables Homes**, c/o Alwin Cassens, Jr., archt. 145 S. Franklin Ave., Valley Stream, N. Y. Owner Builds. **$1,200,000**, 90 HOUSES, Oakfield Ave., south of Jerusalem Ave., BELLMORE, N. Y.

▲ **Brightwater Knolls Homes**, c/o Charles Wood, archt., 630 Broadway, Amityville, N. Y. Owner Builds. **$2,700,000**. 225 HOUSES, Union Ave. and Gardiner Dr., WEST BRIGHTWATERS, N. Y.

Crestwood Knolls Homes, c/o Alwin Cassens, Jr., archt., 145 S. Franklin Ave., Valley Stream, N. Y. Owner Builds. **$400,000**. 43 HOUSES, tract at Elmore St. and Cordello Ave., CENTRAL ISLIP, N. Y.

Berkshire Manor Homes, c/o Henry A. Klar Realty Co., 220-02 Horace Harding Blvd., Bayside Hills, N. Y. Owner Builds. **$800,000**, 63 HOUSES, Pulaski Rd., east of Larkfield Rd., EAST NORTHPORT, N. Y.

Valmont at Larkfield Homes, c/o Salvatore S. Calafati, archt., 4th St., East Northport, N. Y. Owner Builds. **$880,000**, 63 HOUSES, Larkfield Rd., north of Jericho Turnpike, EAST NORTHPORT, N. Y.

▲ **Kayuna Estates**, c/o Frank J. Morgan, archt., 253 Broadway, Troy, N. Y. Owner Builds. **$5,500,000**. 275 HOUSES, 140-acre tract, St. David's Lane near Consul Rd., Niskayuna, N. Y.

Squirrel Hill Homes, c/o Karl Block, archt., 7 Landsdown Ave., Merrick, N. Y. Owner Builds. **$800,000**. 80 HOUSES, tract at Tariff and Milton Sts., SAYVILLE, N. Y.

Clifton Estates Homes, c/o Erwin Gerber, archt., 1180 Raymond Blvd., Newark, N. J. Owner Builds, **$450,000**. 20 HOUSES on tract at Broad St. and Route 3, CLIFTON, N. J.

Aldecress Knolls Homes, c/o Maniscalo & Hecker, archts., 332 River St., Hackensack, N. J. Owner Builds, **$450,000**. 18 HOUSES on tract at Anderson Ave. and Maplewood Dr., CLOSTER, N. J.

Closter Knolls Homes, c/o H. Milkon Co., 35-12 Broadway, Fairlawn, N. J. Owner Builds, **$340,000**. 20 HOUSES, on tract at Walker Ave. and Piermont Rd., CLOSTER, N. J.

V. & F. Constr. Co., c/o Fred Hansen, archt., Summit St. and East Railroad Ave., Tenafly, N. J. Owner Builds. **$300,000**, 19 HOUSES, John St., ENGLEWOOD, N. J.

Wynetta Acres, c/o John M. Gabriel, 334 State Hy. 17, Paramus, N. J. Owner Builds. **$550,000**, 35 HOUSES in track on Glenn Ave. off Route 17, PARAMUS, N. J.

Gregory Plaza Homes, c/o John M. Gabriel, 334 State Hy. 17, Paramus, N. J. Owner Builds. **$500,000**. 34 HOUSES on tract on Midland Ave. off Fairview Ave., PARAMUS, N. J.

Jeffer Court Homes, c/o Howard A. Day, 61 N. Maple Ave., Ridgewood, N. J. Owner Builds. **$550,000**, 20 HOUSES on tract at Jeffer Court and Linwood Ave., RIDGEWOOD, N. J.

Joseph L. Muscarelle, Inc., 42 First St., Hackensack, N. J., CA, **$500,000**, WAREHOUSE on 3½ acre tract of Route 46, SOUTH HACKENSACK, N. J. Belding-Corticelli, 1407 Broadway, New York 36, N. Y.

▲ **Suburbia Lake Estates**, c/o Walter H. Kremer, 13-00 Plaza Road, Fairlawn, N. J., Owner Builds, **$1,200,000**. 50 HOUSES on tract on Devon Rd., north of Westgate Rd., WASHINGTON TWP., N. J.

† **Aetna Constr. Co.**, 4118 Ridgewood Ave., Baltimore, Md. LB **$419,000**. masonry enlisted men's BARRACKS ENG-18-020-55-8, ABERDEEN PROVING GROUND, MD. U. S. Eng., 24 St. and Maryland Ave., Baltimore, Md. Bids Sept. 22. CD 9/15.

Our Lady of Pompei R. C. Church, Claremont and Conklin Sts., Baltimore, Md., rejected bids Aug. 11, 3 story, brick SCHOOL, HALL, RECTORY and CONVENT, BALTIMORE, MD. **$650,000**. Will re-advertise. CD 8/11.

Wm. P. Lipscomb, Inc., Woodward Bldg., Wash., D. C., LB, **$794,000**, 18 story steel, stone, brick aluminum OFFICE, 200 K St. N.W., WASH., D. C. National Automobile Dealers Assoc., 1026 17 St. N.W., Wash., D. C. Bids Sept. 22. A. R. Clas, 530 Wyatt Bldg., Wash., D. C., archt.

SOUTH

BIDS ASKED—HEAVY CONSTRUCTION

† **Va., Little Creek**—DERRICK RELOCATION—BA 10/12—P. Wks. Office, Fifth Naval Dist., U. S. Naval Base,

(Continued on page 360)

NELLO L. TEER CO.
CONTRACTORS
DURHAM, N.C.

Contractor boosts output of shovel with
WESTINGHOUSE PNEUMATIC CONTROL

The operator of this big quarry shovel manipulates it accurately and quickly with easy movements of his hands. Westinghouse Pneumatic Control, installed by Livingston & Haven, Charleston, S. C., boosted shovel production and cut operator fatigue.

Orders similar pneumatic controls for three other shovels

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When this successful contractor replaced manual control with Westinghouse Pneumatic Control on a quarry shovel, he found it increased the shovel's production, required less maintenance, reduced operator fatigue and put more power into the crowd. As a result, he is sold on Westinghouse Pneumatic Control, and has ordered it for three more of his machines.

You also want fast easy operation, low maintenance and dependability for your earth-moving equipment. Get it by specifying Westinghouse Pneumatic Control for your new equipment. Call the nearest Westinghouse Distributor for complete details on installing this pneumatic control on your present manually controlled equipment—he is listed in your classified telephone directory.

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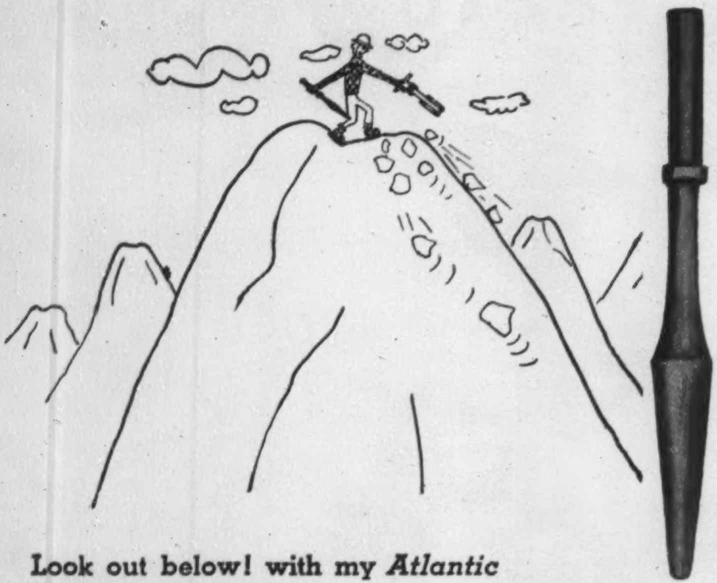

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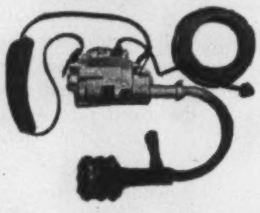

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CINCINNATI 32, OHIO

(Continued from page 358)

Norfolk, Zone 11, relocating stiffleg derrick, Naval Amphibious Base, NOY 84432, Spec. 42771. Plans deposit $10.

† **S. C., Sumter**—HARDSTAND, etc.—BA 10/21—U. S. Eng., Customhouse, Charleston, calibration hardstand and firing in butt, Shaw Air Force Base, No. 38-081-55-4. CD 9/25/51.

† **North Carolina**—BA About 10/22—U. S. Eng., 308 Customhouse, Wilmington, constr. of survey and dredging ranges at Morehead City Harbor, Inv. No. CIVENG-31-075-55-3. Plans deposit 40c.

† **Fla., Cocoa**—BA On Or About 11/5—U. S. Eng., P.O. Box 4970, Jacksonville, Missile Shop "J" and electrical power plant addn. (FY-54) Air Force Missile Test Center, Patrick Air Force Base, ENG-08-123-55-23. CD 4/4/51.

† **North Carolina**—BA About 11/5—U. S. Eng., 308 Customhouse, Wilmington, constr. guard and guide walls, Lock and Dam No. 3, Cape Fear River, above Wilmington, Inv. No. CIVENG-31-075-55-1. Plans deposit 80c.

BIDS ASKED—BUILDINGS

† **Va., Portsmouth**—BUILDINGS REPAIRS—BA 10/12—P. Wks. Office, Fifth Naval Dist., U. S. Naval Base, Norfolk, Zone 11, buildings repairs, Norfolk Naval Hospital, NOY 84475, Spec. 42789. Plans deposit $10.

Ala., Birmingham—SCIENCE—BA 10/13—Howard College, 7725 2 Ave. South, science bldg. $500,000. Van Keuren & Davis & Co., 3004 7 Ave. S., archts. CD 11/18/52.

Ga., Moultrie—PLANT—BA 10/14—Riverside Mfg. Co., Moultrie, garment plant, $400,000. Robert & Co. Assocs., 96 Poplar St. N. W., Atlanta, archts.

† **Ala., Huntsville**—BARRACKS—BA 10/19—U. S. Eng., P. O. Box 1169, Mobile, Zone 7, 3-story barracks, with mess hall, Redstone Arsenal. CD 11/30/51.

Fla., Crestview—SCHOOLS—BA 10/19—Okaloosa Co. Bd. P. Instruction, Crestview, 4 schools $600,000. Norman P. Gross, 423 W. Beach Dr., Panama City, archt. CD 1/14.

▲ **Ga., Butler**—SCHOOLS—BA 10/21—Taylor Co. Bd. Educ., Butler, schools. $1,000,000. Plans deposit $50. Dennis & Dennis, Bankers Insurance Bldg., Macon, archts. CD 8/28/52.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

▲ **NORTH CAROLINA - VIRGINIA** — Carolina-Virginia Turnpike Auth. and Virginia Coastal Turnpike Auth., Virginia Beach, Va.

Brown-Coble Constr. Co., Lexington, N. C., CA **$785,883** (295 calendar days), Proj. 1, Alt. No. 1, 5 in. plant mix sand asph., 24 ft. pavement; Virginia Beach-Nags Head Rd. on the Carolina end;

E. V. Williams Co., Inc., 1269 E. Princess Anne Rd., Norfolk, Va. and **W. H. Scott, Inc.**, Franklin, Va., CA **$724,630**, (280 calendar days), Proj. No. 2, Alt. 3, Addendum No. 2, 4 in. sub. base mat., 4 in. clay gravel with base, 2 in. plant mixed asph. surf. 24 ft. pavement; Virginia portion of Hy.; CA **$86,031**, Proj. No. 3, culverts and bridges, foregoing for 53 mi. coastal toll road between Nags Head, N. C. and Virginia Beach, Va. Bids Sept. 15, awarded Sept. 23. CD 9/20, under LB.

A. Stanley Mundy, 54 Main St., Woodbridge, N. J., CA **$311,393**, water mains, COLUMBIA, S. C. City, City Hall, Columbia, S. C. Bids Sept. 14. CD 9/2.

▲† **Sun Constr. Corp.**, 2100 Ailor Ave., Knoxville, Tenn., LB, **$2.098.815**, research bldg., Patrick Air Force Base. ENG-08-123-55-14, COCOA, FLA. U. S. Eng., P.O. Box 4970, Jacksonville, Fla. Bids Sept. 21. CD 8/12.

Powell Bros., Inc., 14 S. E. 1 Ave., Fort Lauderdale, Fla., CA **$64,370**, sewage pumping station on S.W. 14 St., FORT LAUDERDALE, FLA. City, City Hall, Fort Lauderdale, Fla. Bids Sept. 16. CD 2/11.

E. C. Kenyon, 4267 Verona Ave., Jacksonville, Fla., CA **$98,807**, Southside Swimming Pool, JACKSONVILLE, FLA. City, City Hall, Jacksonville, Fla. Bids Sept. 9. CD 8/27.

C. O. Osborn Constr. Co., 1606 2 Place, South, Birmingham, Ala., CA **$201,000**, storm sewers, BIRMINGHAM, ALA. City, City Hall, Birmingham, Ala. Bids Sept. 13. CD 9/7.

† **Butler & Cobb**, Bell Bldg., Montgomery, Ala., LB, **$292,926**, guided missile training facilities, Redstone Arsenal, HUNTSVILLE, ALA. U. S. Eng., P.O. Box 1169, Mobile 7, Ala. Bids Sept. 21. CD 9/2.

Sullivan, Long & Hagerty, 2026 2 Ave., Bessemer, Ala., CA **$359,733**, water and sewer lines, MOBILE, ALA. City, City Hall, Mobile, Ala. Bids Sept. 16 CD 8/30, under Sewers, Waste Disposal and 8/31, under Water Supply.

J. B. McCrary Co., Atlanta Federal Bldg., Atlanta, Ga. LB **$973,707**. sanitary sewers, MOSS POINT, MISS. City, Moss Point, Miss. Bids Sept. 14. CD 9/2.

T. L. James & Co., Inc., Ruston, La. LB **$998,416**. hydraulic embankment 7.8 mi. Ponchatoula Manchac Hy., State Rte. 33, S.P. 17-02-21, Tangipahoa Parish, LOUISIANA. State Hy. Dpt., Highway Office Bldg., Baton Rouge, La. Bids Sept. 22. CD 9/2.

▲ **Robert Simmons Constr. Co.**, 840 Barrett Ave., Louisville, Ky. LB **$1,516,000**, general contract auditorium, new State Fair Grounds, LOUISVILLE, KY. State Properties & Bldg. Comn., Frankfort, Ky. Bids Sept. 23. CD 8/9.

TENNESSEE—State Hy. Dpt., Nashville,

Blanton & Gillespie, Adamsville, Tenn., LB **$185,328**, four bridges and approaches on State Rte. 10 between

(Continued tn page 362)

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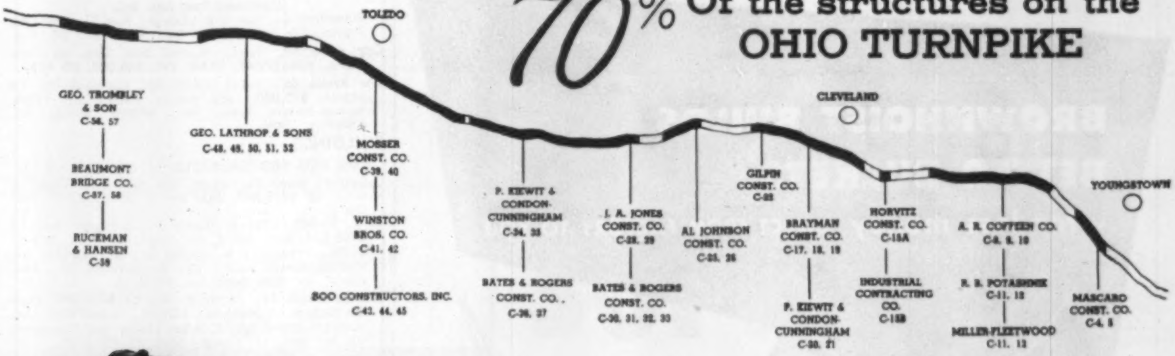
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CLEVELAND
YOUNGSTOWN
GEO. TROMBLEY & SON C-56, 57
BEAUMONT BRIDGE CO. C-57, 58
RUCEMAN & HANSEN C-59
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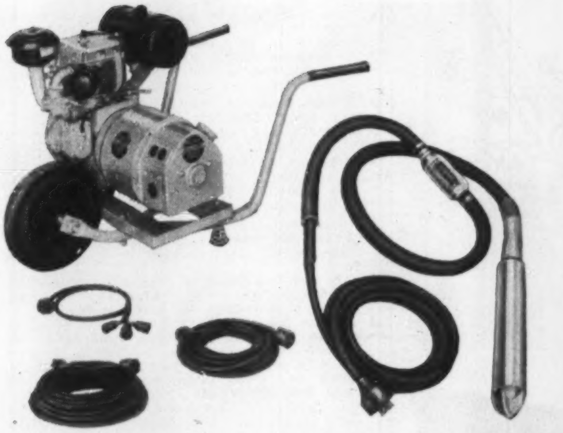
HORVITZ CONST. CO. C-15A
INDUSTRIAL CONTRACTING CO. C-15B
A. R. COFFEEN CO. C-8, 9, 10
R. B. POTASHNIK C-11, 12
MILLER-FLEETWOOD C-11, 12
MASCARO CONST. CO. C-4, 5



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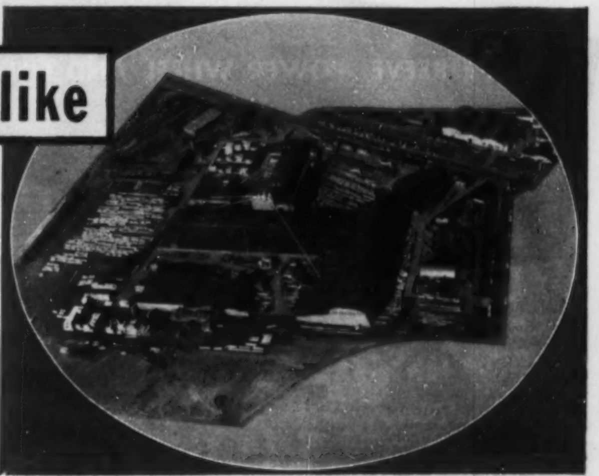

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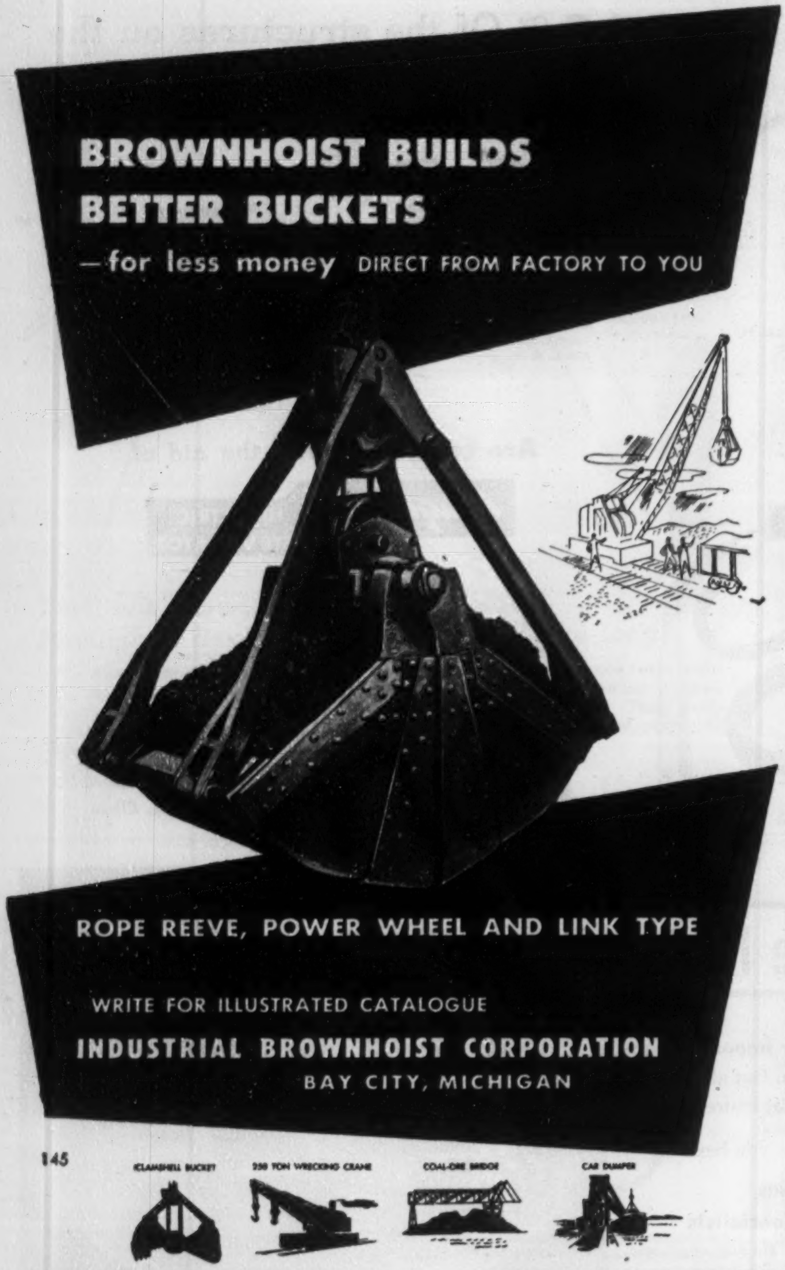
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(Continued from page 360)

Rutherford Co. line and Lebanon, Part II, Proj. No. F-010-3-(2), Wilson Co. Bids Sept. 24. CD 9/8.

City, Kingsport, Tenn., rejected bids Sept. 21, WW imprvs. KINGSPORT, TENN. Est. **$40,000.** CD 9/8.

The Austin Co., 16112 Euclid St., Cleveland, O., CA Approx. **$75,000.** radio station, KNOXVILLE, TENN. Scripps-Howard Radio, Inc., Whittle Springs Rd., Knoxville, Tenn.

BUILDINGS

LOW BIDS AND CONTRACTS

Joseph F. Nebel Co., 2142 "P" St., N.W. Wash. 7, D. C. LB **$575,687,** Base Bid 1; LB **$530,687,** Base Bid 2;

E. L. Daniels, 1511 N. Quincy St., Arlington, Va., LB **$458,624,** Base Bid 3, for constr. MEDICAL OFFICE BLDG., 3713-3813 N. Fairfax Dr., ARLINGTON, VA. Medical Dental Assoc., 121 S. Columbus St., Alexandria, Va. Bids Sept. 22. CD 9/16.

Mottley Constr. Co., Farmville, Va., CA **$499,240,** Phoebus-Buckroe Elementary SCHOOL, HAMPTON, VA. Hampton School Bd., C. Alton Linsey, supt., Hampton, Va. Bid Sept. 21, awarded Sept. 23. CD 8/26.

▲ **Walsh Constr. Co.,** 5 W. 34 St., New York, N. Y. and **William Muirhead Constr. Co., Inc.,** E. Trinity Ave., Durham, N. C., CA Approx. **$6,000,000.** industry control equipment PLANT, near ROANOKE, VA. General Electric Co., River Rd., Schenectady 5, N. Y. Bids Aug. 26, awarded Sept. 23. CD 8/23.

M. B. Kahn Constr. Co., P.O. Box 595, Columbia, S. C. CA Approx. **$300,000.** BAKERY, WAREHOUSE, COLUMBIA, S. C. Edens Food Stores, Inc., Rosewood Dr., Columbia, S. C. Bids Sept. 10. CD 8/27.

Abco Builders, 2220 College Ave. S. E., Atlanta, Ga., CA, **$303,000.** ACTIVITY BLDG. at Georgia Home for Aged, ADAMSVILLE, GA. Georgia State Dpt. P. Welfare, State Office Bldg., Atlanta, Ga.

Ira H. Hardin, 174 Mills St. N. W., Atlanta, Ga., CA, **$288,000** WAREHOUSE, ATLANTA, GA. Southern States Iron Co., 1530 Ellsworth St. N. W., Atlanta, Ga.

Sam N. Hodges & Co., Bona Allen Bldg., Atlanta, Ga. CA, **$85,000** WAREHOUSE, ATLANTA, GA. J. L. Zachary, 3224 Peachtree Rd. N. E., Atlanta, Ga.

J. A. Jones Constr. Co., 133 Ellis St. N. E., Atlanta, Ga. CA, **$657,800.** APARTMENT, ATLANTA, GA. Peachtree Road Apartments, Inc., 2520 Peachtree Rd. N. E., Atlanta, Ga. Bids Sept. 21. CD 9/1.

Swift & Co., Union Stockyards, Chicago, Ill., Day Labor, **$100,000** PLANT addn., ATLANTA, GA.

W. T. Swinks, Jr., 139 Valley Brook Rd., Atlanta, Ga. Force Account, **$300,000** APARTMENT UNITS, ATLANTA, GA.

T. C. McCarthy, 5346 Powers Ferry Rd., Atlanta, Ga., CA, **$91,222.** WAREHOUSE-SALES, ATLANTA, GA. Second Realty Corp., c/o James C. Wise, archt., 305 Techwood Dr. N. W., Atlanta, Ga. CD 9/7.

Clarence Mobley Contg. Co., 640 11 St. Augusta, Ga. CA, **$325,000** CHURCH, AUGUSTA, GA. Woodlawn Baptist Church, 815 Chafee Ave., Augusta, Ga. Bids Sept. 15. CD 9/2.

Jordan Contg. Co., Box 1179, Columbus, Ga., LB, **$532,236,** SCHOOLS, DONALSONVILLE, GA. Seminole Co. Bd. Educ., Donalsonville, Ga. Bids Sept. 14. CD 8/27.

Norman Johnson, 1223 N. Federal Hy., Hollywood, Fla., CA, Force Account, **$395,000.** 58 RESIDENCES, HOLLYWOOD, FLA. James A. Young, First Natl. Bank Bldg., Hollywood, Fla., archt.

Gerald E. Hall Constr. Co., 234 Valencia Ave., Coral Gables, Fla., Force Account, **$450,000,** 30 RESIDENCES, MIAMI, FLA. Harry E. Penney, 5944 Sunset Dr. S., Miami, Fla., archt.

Century Constr. Co., 5148 S. W. 8 St., Coral Gables, Fla., Force Account, **$395,000.** 39 RESIDENCES, MIAMI, FLA. G. Pitt, Congress Bldg., Miami, Fla., archt.

Chavis Constr. Co., 41 E. Wright St., Pensacola, Fla., CA, **$363,777.** Brentwood Junior High SCHOOL, PENSACOLA, FLA. Escambia Co. Bd. P. Instruction, Pensacola, Fla. Bids Sept. 22. CD 9/1.

Mulbry, Inc., New Smyrna Beach, Fla., CA, **$373,658** HOSPITAL, STARKE, FLA. Bradford Co., Court House, Starke, Fla. Bids Sept. 8. CD 8/27.

Paul Smith Constr. Co., P. O. Box 1912, Tampa, Fla., Force Account, **$100,000** WAREHOUSE, TAMPA, FLA.

Foster Associates, Inc., P. O. Box 10232, Tampa, Fla., CA, **$781,000,** 103 RESIDENCES, TAMPA, FLA. Manhattan Manor, Cameron St., Tampa, Fla.

R. P. Henderson & Son, Pell City, Ala., CA, **$559,640** branch COURT HOUSE, PELL CITY, ALA. St. Clair County Bd. Revenue, Court House, Ashville, Ala. Bids Sept. 8. CD 9/1, under LB.

Rives Constr. Co., 1015 7 Ave. S., Birmingham, Ala., CA, **$166,000** WAREHOUSE, BIRMINGHAM, ALA. Pure Oil Co., Mims Ave., Birmingham, Ala. Bids Sept. 15. CD 9/8.

▲ **Bear Bros., Inc.,** 25 E. Jefferson St., Montgomery, Ala., CA, **$1,500,000.** SHOPPING CENTER, MONTGOMERY, ALA. Eastbrook Land Co., Jefferson St., Montgomery, Ala.

Wetmore & Parman, Inc., P.O. Box 63, Jackson, Miss. CA **$647,104.** OFFICE, JACKSON, MISS. Hinds Co., Court House, Jackson, Miss. Bids Sept. 8. CD 8/25.

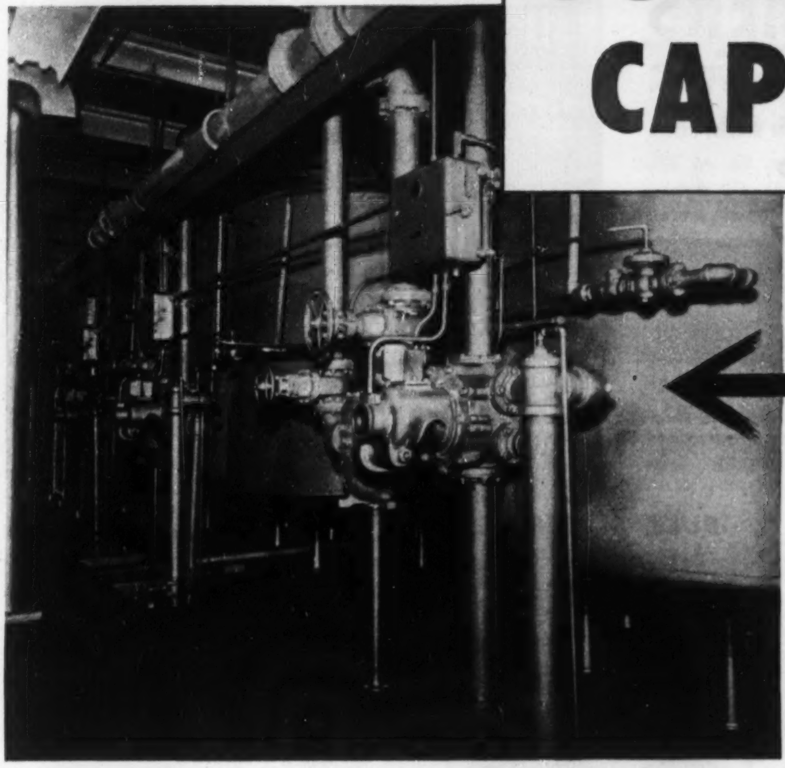
▲ **State Div. Admin.,** State Capitol, Baton Rouge, La. rejected bids Aug. 31. 1 story, brick, 46,000 sq. ft. RECEIVING BLDG. at Southeast Louisiana Hospital, MANDEVILLE, LA. LB **$1,043,951.** Will re-advertise. CD 9/8, under LB.

Struck Constr. Co., N. Clay St., Louisville, Ky. LB **$205,000.** prefabricated FACTORY addn., LOUISVILLE, KY. Marley Co., 600 Bergman St., Louis-

(Continued on page 364)

How the Town of Normal, Illinois

TRIPLED SOFTENING CAPACITY



...of the same softeners

...by changing to PERMUTIT Q

Replacing old-fashioned zeolite with the high-capacity ion exchange resin, Permutit Q, saves Normal over $7,000 a year!

Normal's three automatic softeners were installed back in 1946, before high-capacity Permutit Q was available. Each softener removed hardness from 83,000 gallons of water between regenerations for a daily delivery of 700,000 gallons of softened water.

Recently town officials called in Consulting Engineers, Farnsworth and Conley, of Bloomington, Illinois, who recommended replacing zeolite with modern, high-capacity Permutit Q.

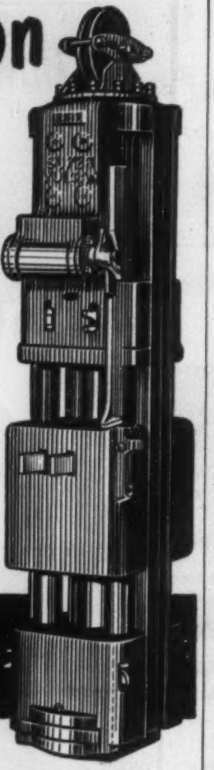
Look at the benefits gained from this change! The capacity of each softener is up from 83 to 270 thousand gallons between regenerations. Salt Consumption – down to about ¼ lb. per thousand grains of hardness removed. Flow Rate–up from 285 to 510 gpm. Regenerations – down from 3 times to once per day per softener.

A change to Permutit Q may effect similar economies for your city. We'll gladly send helpful data.

The Permutit Company, Dept. ENR-10, 330 West 42nd Street, New York 36, N. Y., or Permutit Company of Canada, Ltd., 6975 Jeanne Mance Street, Montreal.

WATER CONDITIONING HEADQUARTERS FOR
OVER 40 YEARS

PERMUTIT®


Greater Penetration Per Blow

SUPER VULCAN

DIFFERENTIAL ACTING

PILE HAMMERS

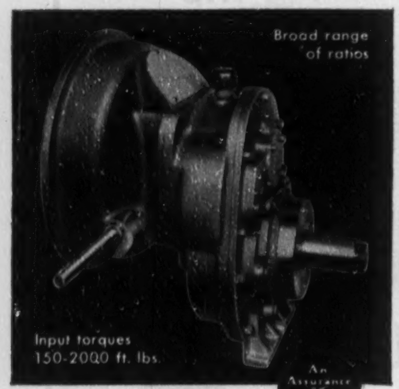
Rugged strength, simple design, positive action. Delivers twice the usual number of blows per minute with 25 to 35 per cent less steam per blow.

WRITE TODAY FOR COMPLETE DETAILS AND NAME OF NEAREST DEALER

VULCAN IRON WORKS

Manufacturers of Pile Driving Hammers and Pile Extractors Since 1852

VULCAN IRON WORKS • 329 NORTH BELL AVENUE • CHICAGO 12, ILL.


Broad range of ratios
Input torques 150-2000 ft. lbs.
An Assurance of Dependable Service

Special heavy-duty

- Transmissions
- Reduction Units
- Mechanical Drives for Torque Converters

Cotta Transmission Co., Rockford, Illinois

COTTA

HEAVY-DUTY TRANSMISSIONS

"Engineered-to-order"

SPEED BULK MATERIAL HANDLING

SCOOT-CRETE

BUILT FOR THE TOUGH JOBS!

SCOOT-CRETE

Scoot-Crete Model N-52, Pay Load, 3,000 lbs.

Scoot-Crete's heavy-duty, truck transmission stands up under the worst operating conditions; delivers maximum horsepower from the Wisconsin air-cooled engine to the heavy-duty, high-traction 7:50x10, 6-ply U.S. Royal tires. Scoot-Crete scoots 3,000 lb. loads up 25% grades, in plants and at construction sites, has caster steering—turns in its own 90" over-all length. Dump box body interchangeable with flat rack in a few minutes. Speeds, 1 to 15 mph. Model N-52 in 14, 16 cu. ft. capacities. Other Scoot-Crete models available in 8, 12, 20, 27 cu. ft. capacities. Also, available with Diesel Powered engine. Write today for specifications and performance facts.

GETMAN BROTHERS

Manufacturing Division

South Haven 2, Michigan

(Continued from page 362)

ville, Ky. Joseph & Joseph, Speed Bldg., Louisville, Ky., archts. E. R. Ronald & Assoc., 554 S. Third St., Louisville, Ky., engrs. CD 9/2/53.

O'Brien & Padgett, 283 Scott St., Memphis, Tenn., CA Approx. **$100,000**. auto parking GARAGE, CHATTANOOGA, TENN., Parkrite System, Inc., Sterick Bldg., Chattanooga, Tenn.

W. A. Catlett Constr. Co., 3601 Chapman Hy., Knoxville, Tenn., CA Approx. **$125,000**. WAREHOUSE No. 2, KNOXVILLE, TENN. H. L. Perkins, Cherry St., Knoxville, Tenn.

MIDDLE WEST

BIDS ASKED—HEAVY CONSTRUCTION

Ind., Bloomington — BA 10/14 — Indiana University, Bloomington, WW sys. addns., incl. (1) pump house (2) 2 centrifugal pumps (3) 100,000 gal. elevated water tank (4) concrete fdns. for tank (5) c.i. water mains, valves and fittings. Plans deposit $25. Garns & Moore & Assocs., 827 K. of P. Bldg., Indianapolis, engrs.

▲ **O., Toledo**—BA 11/3—City, H. G. Rebensal, comr. Purchases, Safety Bldg., 40 m.g.d. to Collins Park Filtration Plant, Contr. 87A, structures, Contr. 87B, piping and equipment; Contr. 87C electrical. $3,700,000. Plans deposit $50. Finkbeiner, Pettis & Strout, 518 Jefferson St., engrs. CD 10/8/51.

BIDS ASKED—BUILDINGS

Mich., Ionia—DORMITORY—BA 10/13—State, A. N. Langius, dir. State Bldg. Dpt., Lewis Cass Bldg., Lansing, brick, steel, concrete dormitory addn., Ionia State Reformatory. $400,000. Plans deposit $20. Clair W. Ditchy, 5 W. Larned St., Detroit, archt. CD 8/17.

▲ **Ill., Elmwood Park**—SCHOOL—BA 10/14—School District 232, 2319 76 Ave., high school, Oak Park Country Club Site. $2,000,000. Nicol & Nicol, 23 E. Jackson Blvd., Chicago, Zone 4, archts. CD 9/11/53.

Ill., Harvard—HOSPITAL—BA 10/14—Harvard Community Hospital District, 1 story, L-shaped, 42x277 ft., and 67x75 ft. hospital $400,000. Durrante & Bergquist, 197 Jones St., Dubuque, Ia., archts. CD 11/2.

O., Boardman—SCHOOL—BA 10/14—Bd. Educ., Boardman School Dist., 7410 Market St., Youngstown, Unit B, Boardman School alterations, addns. Plans deposit $25. Chester V. Long, 5980 Glenwood St., Youngstown, archt. CD 8/6.

Ind., Hammond—SCHOOL—BA 10/15—School City of Hammond, 5935 Hohman Ave., Thomas Jefferson Elementary School, 169 and North Cote Aves. $600,000. L. Cosby Bernard, 7241 Forest Ave., archt. CD 4/29.

O., Cincinnati—SCHOOL—BA 10/21—Bd. Educ., 216 E. 9th St., Kennedy Heights Junior High School. Plans deposit $50. CD 11/5.

O., Athens—DORMITORY—BA 11/4—Ohio University, Athens, 4 story brick, rein.-con. Dormitory No. 10. $831,800. Plans deposit $25. Potter, Tyler, Martin & Roth, 128 E. 6th St., Cincinnati, engrs.-archts. CD 7/21.

▲ **Mich., East Lansing**—SCHOOL—BA 11/16—City, C. E. MacDonald, supt. Schools, high school, Abbott Rd. $1,850,000. Warren S. Holmes Co., 2200 Olds Tower, Lansing, archt. CD 3/3.

Ill., Chicago—SUB-STATION—Bids Asked—Commonwealth Edison Co., 72 W. Adams St., Zone 3, Natoma Sub-station, 6600 W. Grand St., $130,000. CD 9/22.

Ill., Stickney—GENERATING STATION—Bids Asked—Commonwealth Edison Co., 72 W. Adams St., Chicago, Zone 3, generating station, Ridgeland Ave. and Chicago Ship Channel, $90,000.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

▲ **OHIO**—State Hy. Dpt., Columbus,

The Baker & Hickey Co., P.O. Box 5008, Tri-Vilage Station, Columbus, O., CA **$1,387,338**, est. $1,494,700, Type T-71 and structures 2.738 mi. S.R. 120, Sect. 3.79, UI-1052 (11), (Part No. 5), City of Toledo, Lucas Co. Bids Sept. 14. CD 9/22, under LB.

T. & M. Constr. Co., Lodi, O., CA Approx. **$106,700**, replacement 4½ mi. 6⅝ in. pipe with 10¾ in. pipe to better supply U. S. Gypsum and Celotex Corp. plants, Port Clinton, Ottawa Co., OHIO. Ohio Fuel Gas Co., 99 N. Front St., Columbus, O. CD 5/11.

McManus & McCarthy, Inc., 416 W. Benson St., Reading, O. CA **$697,560**, West Branch Ohio River Interceptor from Neave St. to Delhi Ave., CINCINNATI, O. City, City Hall, Cincinnati, O. Bids Sept. 21. CD 9/8.

Marvin E. Farrier, 704 Greenmount Blvd., Dayton, O. CA **$67,577**, imprv. Kemp Rd. in Mad River Twp. from B & O R. R. to Green Co. line, DAYTON, O. Comrs. Montgomery Co., Court House, Dayton, O. Carl Bauer, 101 N. Mo[illegible]s Ave., Dayton, O., co. engr. Bids Sept. 16. CD 4/28/52.

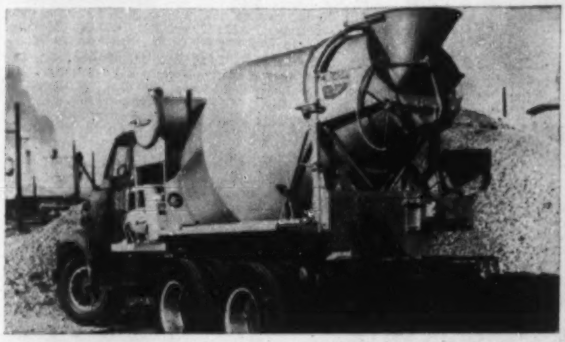
† **LaSalle-Ohio Corp.**, 1152 Goodale Blvd., Columbus, O. CA **$223,947**, designing, prefabricating and erecting 200,400 sq. ft. portable shelters, Rossford Ordnance Depot, near TOLEDO, O. U. S. Eng., 237 Fourth Ave., Huntington, W. Va. CD 7/2/52.

John Maag, 607 S. Market St., Waterloo, Ill., LB **$237,566**, est. $249,585, Hawthorne Pumping Station, Item IV-C, Wood River Drainage and Levee Dist., Madison Co., CIVENG-23-065-55-3, ILLINOIS. U. S. Eng., 420 Locust St., St. Louis 2, Mo. Bids Sept. 21. CD 8/16.

▲ **Michael Pontarelli**, 4248 N. Kilpatrick St., Chicago, 41, Ill., LB **$1,344,863**, Kostner Ave. Sewerage System, North Ave., Lockwood Ave., Bloomingdale

(Continued on page 366)

TRANSCRETE AVAILABLE IN 3 TO 6 YARD CAPACITIES



CMC's Transcrete — the simplest truck mixer of all — features the famous "Thoro-Mix" action that charges, mixes, and discharges all slumps faster.

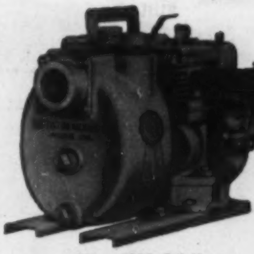
Large drum diameter, deep "L" section blades and a progressively increasing blade slope are drum design features that make for more thorough mixing, more positive discharge, and a greater ability to handle stiff, low slump mixes.

Transcrete's time saving efficiency means more trips per day as mixer or agitator.

Quality construction and simplified rugged design assure trouble-free life.

Transcrete offers you the choice of a profit making size at the price you want to pay.

CMC DUAL PRIME PUMPS ARE LIGHTER WEIGHT YET LONGER LIVED

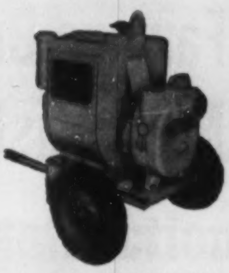


4M — 4000 G.P.H.

New dual volute design makes priming rapid, automatic and dependable. Unipacked shaft seal is protected by rapidly spinning liquid screen. Fewer parts — easier to service.

ALL SIZES

Built in all pipe sizes 1½" through 4". Other CMC Dual Primers in 6", 8" and 10" sizes with capacities to 240,000 G.P.H. Larger pumps have water cooled engines — gasoline or diesel. Also full line of electric pumps and pumps for belt drive.

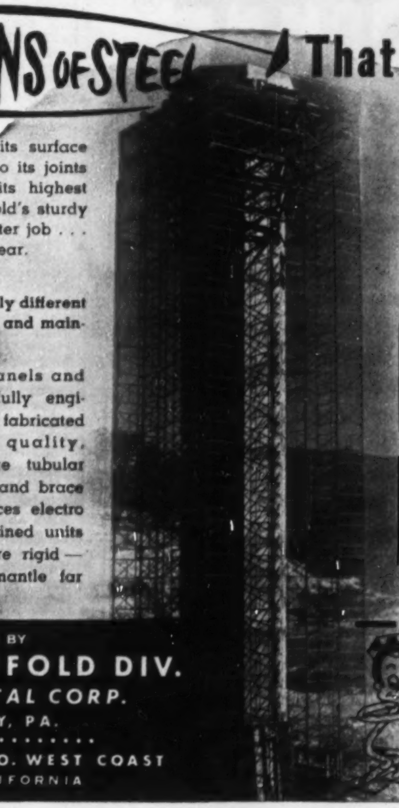


40M — 40,000 G.P.H.

SOLD & SERVICED BY AMERICA'S BEST DISTRIBUTORS

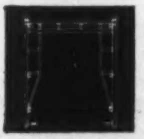
CONSTRUCTION MACHINERY COMPANIES . . . . WATERLOO, IOWA

SKELETONS OF STEEL That Build to Profits - Real



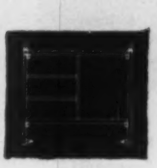
Snow, sleet and rain eat at its surface . . . mortar and plaster cling to its joints . . . workmen clamor over its highest reaches—but **ADVANCE** scaffold's sturdy framework holds fast on job after job . . . returns user profit year after year.

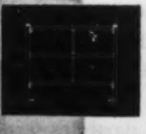
What makes ADVANCE the truly different scaffolding tool for construction and maintenance work?

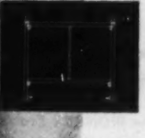


Just this! Panels and braces carefully engineered and fabricated of highest quality, heavy gauge tubular steel. Panel and brace locking devices electro welded into integral self-contained units that go up faster — stand more rigid — provide greater safety — dismantle far easier . . . without lost parts.

And — no matter what the task, **ADVANCE** engineers are ready to provide, without cost, highly specialized assistance that will enable you to realize substantial savings over the use of makeshift wood or outmoded metal scaffold.







Scaffolding, materials hoisting towers, and other similar tools which carry the Beaver-**ADVANCE** trademark are available nationally for sale or rental through leading construction and industrial equipment distributors. Clip and mail the coupon for free descriptive literature and the name of your nearest dealer.

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(Continued from page 364)

Ave. to Merrimac Ave., CHICAGO, ILL. City, City Hall, Chicago, Ill. Bids Sept. 17. CD 9/9.

Di Vito Constr. Co., 1929 N. Harlem Ave., Chicago, Ill., CA **$945,080**, water mains and sewer lines, NORTH LAKE, ILL. City, North Lake, Ill. Bids Aug. 26, awarded Sept. 21. CD 9/9, under LB.

Highway Pavers, Inc., 1409 N. 27 St., Milwaukee, Wis., CA, **$74,509**, paving W. Burdick Ave.;

E. J. Neumann Co., 2903 N. 74 St., Milwaukee, Wis., CA **$155,188**; paving W. Melvina St. and W. Eggert Pl. MILWAUKEE, WIS. City, City Hall, Milwaukee, Wis. Bids Sept. 10, awarded Sept. 17.

MICHIGAN—State Hy. Dpt., Stevens T. Mason Bldg., Pine and Michigan Ave., Lansing,

E. C. Nolan Co., 8121 Warren St., Center Line, Mich. LB **$93,761**, est. $100,000. rein-con. T-beam bridge grade separation Detroit-Toledo Expressway over Otter Creek, BM B2 of 58-9-26 C1-R, Monroe Co.; LB **$152,994**, est. $170,000. rein.-con., steel bridge over Otto Creek on Detroit-Toledo Expressway, BM B1 58-9-26 C1-R, Monroe Co. Bids Sept. 22. CD 9/9.

Sinacola Contg. Co., 29155 W. Seven Mile Rd., Livonia, Mich. LB **$298,439**, est. $310,000. altering sewer and water sys., light and power on John C. Lodge Expressway Kenall to Glendale Ave. also in Highland Park, UI 82-128 C13, UI 82-128 C14 (UI404 90), Wayne Co., MICHIGAN. State Hy. Dpt., Stevens T. Mason Bldg, Lansing, Mich. Bids Sept. 22. CD 9/9.

MICHIGAN—State Hy. Dpt., Escanaba,

Straits Constr. Co., St. Ignace, Mich. LB **$92,655**, est. $100,000. rein.-con., steel bridge US-41 and relocation of M-28 over Carp River, FB1 of 52-9-4 C1-R (F 108 4), Marquette Co.; LB **$95,129**, est. $100,000. rein.-con., steel underpass railroad grade separation structure over U.S. 41 and M-26, FX1 of 52-8-4 C2-R (F 108 5), Marquette Co. Bids Sept. 21. CD 9/9.

BUILDINGS

LOW BIDS AND CONTRACTS

▲ **DeBartolo Constr. Co.**, 2620 Market St., Youngstown, O. CA Approx. **$2,500,000.** 28 story SHOPPING CENTER, Fairlawn Plaza Shopping Center, Medina Rd., Copley Twp. west of AKRON, O. Fairlawn Plaza, Inc., c/o Edward J. DeBartolo, 2620 Market St., Youngstown, O.

▲ **Murphy-Fath, Inc.**, 8694 Long Lane, Cincinnati, O. Owner Builds. **$1,020,000**, approx. 70 one-family bsmnt. and bsmntless brick HOMES, off Banning Rd., CINCINNATI, O. Gordon Russell Neal & Assocs., Kemper Lane and Wm H. Taft Rd., Cincinnati, O., engrs. Awarded Sept. 21.

▲ **James I. Barnes Constr. Co.**, 6 Bechtle Ave., Springfield, O., CA **$1,260,000**, general constr. Eastmoor-Junior-Senior HIGH SCHOOL, 417 Weyant Ave. for 1,500 students, COLUMBUS, O. Bd. Educ., 270 E. State St., Columbus, O. Benham, Richards & Armstrong, 1124 Goodle St., Columbus, O. archts. Bids Sept. 17, awarded Sept. 21. CD 8/10.

MacDonald Eng. Co., 188 W. Randolph St., Chicago, Ill., CA Approx. **$600,000**, bulk flour STORAGE BLDG., with 38 sq. concrete bins, 115 ft. high for 6,500,000 lb. flour storage, 2221 Front St., TOLEDO, O. National Biscuit Co., 449 W. 14 St., New York, N. Y.

Henry J. Spieker Co., 1418 Elm St., Toledo, O., CA **$558,000**, general constr. 3 story HIGH SCHOOL, St. Francis de Sales High School for Boys, W. Bancroft at Parkside Blvd., TOLEDO, O. Oblate Fathers of St. Francis de Sales, c/o Catholic Diocese of Toledo, 3407 Drummon St., Toledo, O. Awarded Sept. 23. CD 6/28.

▲ **Herbert C. Beberstein & Poag Custom Homes, Inc.**, c/o George A. Poag & Assoc., Inc., 925 Lincoln Bank Tower, Fort Wayne, Ind., CA, **$4,000,000.** 250 HOMES, southeast edge of city, known as The Village Woods s.e. of corner Anthony Blvd. and McKinnie Ave., FORT WAYNE, IND. George A. Poag & Assocs., Inc., 925 Lincoln Bank Tower, Fort Wayne, Ind.

▲ **Coath & Goss**, 5013 W. Lake St., Chicago, Ill., LB, **$1,007,684** reconstr. traffic courts bldg., 325 N. La Salle St., CHICAGO, ILL. City, City Hall, Chicago, Ill. Bids Sept. 13. CD 8/16.

▲ **Libertyville Homes**, 4942 Milwaukee St., Chicago, Ill., Own Forces, **$3,500,000.** 350 HOMES, near LIBERTY, ILL. A. Sachtleben, 7925 S. Halsted St., Chicago, archt.

H. Schmitt & Son, Inc., 930 E. Burleigh St., Milwaukee, Wis., CA, **$600,000**, general contract CHURCH, RECTORY, MILWAUKEE, WIS. Blessed Sacrament Catholic Congregation, 4103 W. Oklahoma St., Milwaukee, Wis. Bids Sept. 13. CD 8/25.

Oliver Constr. Co., Oconomowoc, Wis., LB **$483,760** 4 story, bsmnt., 70x100 ft. men's DORMITORY, WAUKESHA, WIS. Carroll College, 100 N. East Ave., Waukesha, Wis. Bids Sept. 20. CD 8/25.

Selzer-Ornst Co., 6222 W. State St., Wauwatosa, Wis. CA, **$400,000**, 1 story, part bsmnt., 150x382 ft., WAREHOUSE, GARAGE and OFFICE, WEST ALLIS, WIS. Marmar Corp., c/o Gateway Transportation Co., 2130 South Ave., La Crosse, Wis. Bids Sept. 1. CD 8/27.

▲ **Steinle-Wolfe, Inc.**, Fremont, O. CA Total Est. **$2,900,000.** UNION BLDG. addn., FOOD SERVICE modernization, ANN ARBOR, MICH. Bd. Regents of University of Michigan, W. K. Pierpont, vice pres., Plant Service Bldg., Ann Arbor, Mich. Bids Sept. 9. CD 8/12.

Jeffress-Dyer Co., Ann Arbor, Mich. CA **$894,000.** 100 units for married student HOUSING on North Campus, ANN ARBOR, MICH. Bd. Regents of University of Michigan, W. K. Pierpont, vice pres., 200 Plant Service Bldg., Ann Arbor, Mich. Bids Sept. 15. CD 8/26.

Spence Brothers, 417 McCoskey St., Saginaw, Mich. CA **$604,800.** general contract S. C. Stewart Junior Community SCHOOL, FLINT, MICH. City, W. Eldon Garner, secy. Bd. Educ., 205 E. Eighth St., Flint, Mich. Bids Sept. 2. CD 8/12.

▲ **Coushois & Miller**, 2250 Seminole Dr., Okemos, Mich. Owner Builds. **$1,750,000.** 147 single HOMES, Lakeview Heights No. 4, Orlando Dr., Buckingham Rd., Bayshore Dr. and Hallendale Rd., Biscayne Way and Flamingo Ave., LANSING, MICH.

Ehinger Realty Co., 2800 S. Washington Ave., Lansing, Mich. Owner Builds. **$500,000.** Washington Park Development, 40 single HOUSES, Willard Ave., Almar Lane, Palme St. and Washington Ave., LANSING, MICH.

▲ **Marguerite R. Moore** (agent), 601 West Ottawa St., Lansing, Mich. Owner Builds. **$3,000,000.** Mar-Moore Estates, 230 HOMES, Marmoor Dr., Wagon Wheel Rd., Barton Rd., Apple Tree Lane, Shady Hill Lane, Blackberry Lane, LANSING, MICH.

Mutual Home Co., 1609 Loraine St., Lansing, Mich. Owner builds. **$700,000.** 60 brick veneer HOUSES, Leathers Acres No. 1, Kensington, Melrose and Linden Sts., LANSING, MICH.

Sun Realty Co., 710 N. Pine St., Lansing, Mich. Owner Builds. **$320,000.** 30 brick HOUSES, Spahr Subdivision, Aurelius Rd. Section, LANSING, MICH.

▲ **Hicks Brothers**, 311 E. Grand River, East Lansing, Mich. Owner Builds. **$2,000,000.** 190 HOMES, Dobie Rd. sub-division. OKEMOS. MICH.

WEST OF MISSISSIPPI

BIDS ASKED—HEAVY CONSTRUCTION

Tex., Fort Worth—BA 10/14—City, W. O. Jones, mgr., misc. water mains, Cont. No. 13, $75,000. Plans deposit $15. Uel Stephens, City Water Supt. CD 2/1.

† **Kan., Wichita**—HANGAR APRON—BA 10/15—U.S. Eng., 601 Davidson Bldg., Kansas City 8, Mo., hangar apron McConnell Air Force Base, Inv. 23-028-55-10. CD 9/7.

Nebraska—TELEPHONE LINES—BA 10/19—Rodeo Telephone Membership Corp., Burwell, 467.18 mi. lines in Loup, Blaine, Custer, Garfield, Holt and Valley Counties. $600,000. Nixon Eng., Co., WOW Bldg., Omaha, engr. CD 7/8.

† **Ark., Jacksonville**—FIRE STATION—BA 10/20—U. S. Eng., P. O. Box 867, Little Rock, 1 story, 11,920 sq. ft. crash and structural fire station, Little Rock Air Force Base, ENG-03-050-55-35, $100,000-$500,000. CD 9/22.

(Continued on page 368)

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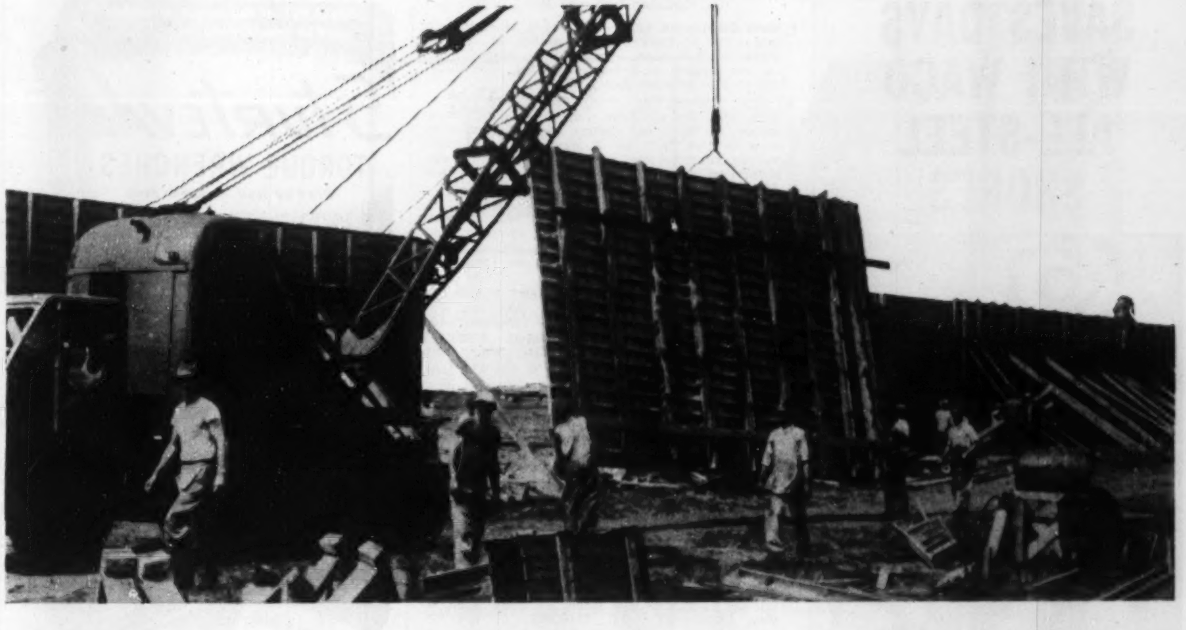

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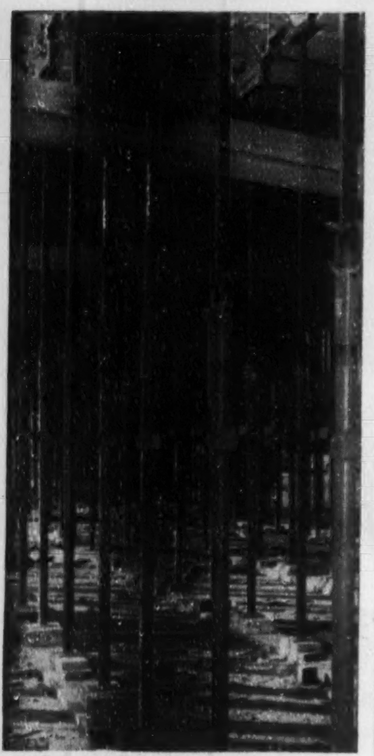

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Waco Manufacturing Co. Los Angeles
Armson Iron Works Windsor, Canada

(Continued from page 366)

† **North Dakota**—BA 10/21—U. S. Eng., Rand-McNally Bldg., 536 S. Clark St., Chicago 15, Ill., channel imprvs. of Rush River, approx. 28 mi. channel clearing and snagging in 8 separate reaches, CIVENG-21-018-55-17. Extended date. CD 9/13.

▲† **Okla., Oklahoma City**—WAREHOUSING—BA 10/21—U. S. Eng., Box 61, Tulsa, Zone 2, Area "A" Warehousing, Lot No. 1, new masonry, rein.-con. frame warehouse in Area "A"; Lot 2, warehouse T-416 addn., masonry, structural steel frame, railway spurs, drainage, utility lines, etc., Tinker Air Force Base, Inv. No. ENG-34-066-55-15. $2,500,000-$4,250,000. CD 9/16.

† **Tex., Abilene**—OPERATION BLDG., etc.—BA 10/21—U. S. Eng., 100 W. Vickery St., Fort Worth, 2 story unit approx. 11,000 sq. ft. masonry operation bldg., and structural steel tower, incl. site grading, drives, walks and drainage facilities, Abilene Air Force Base, ENG-41-443-55-23. CD 12/10/52.

Mo., Kansas City—SEWAGE TREATMENT PLANT—BA 10/22—City, Reed McKinley, dir. P. Wks. Dpt., City Hall, sewage treatment plant, Mid Continent International Airport, $500,000. Haskins, Riddle & Sharp, Finance Bldg., Kansas City, Mo., engrs. CD 5/21.

▲ **Mo., Kansas City**—BA 10/26—City, City Hall, Piers Nos. 1, 2, and 3 of Missouri River Bridge at Broadway, cellular caissons sunk by open dredging and pneumatic process or combination thereof to rest on rock or shale. Howard, Needles, Tammen & Bergendoff, 1805 Grand Ave., Kansas City 8, Mo., consult. engrs. CD 12/17/52.

† **Tex., Kelly Air Force Base**—DORMITORIES, etc.—BA 10/26—U. S. Eng., Box 1229, Galveston, four 3 story, 39x266 ft. dormitories; two 2 story, 41x245 ft. officers quarters, one 39x170 ft. admin. bldg.; one 54x126 ft. mess hall, all concrete frame, masonry, mono walls, etc., Inv. No. ENG-41-243-55-24. $750,000-$1,500,000. CD 9/22.

† **Okla., Altus**—WAREHOUSE—BA 11/4—U. S. Eng., Box 61, Tulsa, base bulk supply warehouse, Altus Air Base, ENG-34-066-55-16. $100,000. CD 6/27/51.

† **Okla., Altus**—OFFICERS QUARTERS—BA 11/4—U. S. Eng., Box 61, Tulsa, bachelor officers quarters, Altus Air Base, ENG-34-066-55-17. $100,000. CD 6/27/51.

† **Tex., Abilene**—WING HEADQUARTERS BLDG.—BA 11/9—U. S. Eng., 100 W. Vickery St., Fort Worth, 2 story, masonry exterior bldg. (2) first floor, concrete slab on fill, second floor and roof wood frame; interior partition wood frame; forced warm air heating sys., approx. 12,300 sq. ft. each in area, incl. walks, access drives parking areas and utilities, Wing Headquarters Bldg., Abilene Air Force Base, ENG-41-443-55-24. CD 12/10/52.

† **North Dakota**—BA 12/15—U. S. Eng., Riverdale, reservoir clearing, Garrison Dam and Reservoir Proj., Stage II, Schedules B, C, D and E, near Riverdale, Inv. 32-015-55-12. Extended date. CD 9/15.

▲ **Texas** — COMPRESSOR STATION — Bids Asked — Trunkline Gas Co., 5650 Kirby St., Houston, compressor station. CD 8/27.

BIDS ASKED—BUILDINGS

Mo., DeSoto—SCHOOL—BA 10/12—DeSoto P. Schools, Bd. Educ., Harry M. Talbot, supt. Schools, 1 and 2 story, brick, concrete, steel 38,500 sq. ft. high school, $400,000. Extended date. Charles W. Lorenz, 700 N. Ballas Rd., Rte. 13, Box 1378, Kirkwood, Zone 22, archt. CD 9/9.

Kan., Witchita—EDUCATIONAL—BA 10/18—First Baptist Church, Second and Broadway educational bldg,. $750,000. Hibbs, Robinson & Pettit, 519 S. Broadway, archts. CD 12/29.

▲ **Tex., Abilene**—DORMITORY—BA 10/19—Abilene Christian College, c/o B. Sherrod, pres., Abilene, 3 story brick, tile, concrete mens dormitory and women's dormitory, air-conditioned. $1,500,000 Plans deposit $20 for one or $30 for both. Wilson, Patterson & Assocs., 601 Bailey St., Fort Worth, archts. CD 9/16.

† **Tex., Fort Hood**—BARRACKS—BA 10/26—U. S. Eng., 100 W. Vickery St., Fort Worth, constr. ten 3 story masonry, rein.-con. frame metal pan joist 263-man barracks with kitchen wing of 1-story, grade beam and drilled pier fdn., mechanical ventilating, ENG-41-443-55-25. CD 8/28/51.

Okla., Oklahoma City—SCHOOL—BA 11/4—Bd. Educ., 400 N. Walnut St., Longfellow School Bldg. addn. on South Penn. $300,000. Reynolds & Morrison, Hightower Bldg., archts. CD 3/26.

▲ **Tex., Laredo**—HOSPITAL—BA 12/8—Sisters of Mercy, Mercy Hospital, Laredo, 6 story, masonry 150-bed hospital. $1,500,000. Plans deposit $50. Wade-Gibson-Martin, 419 Med. Prof. Bldg., Corpus Christi, archts. CD 12/17.

SOON LETS CONTRACTS—BUILDINGS

Tex., San Antonio—OFFICE—Dan S. Harris, trustee, c/o Ralph H. Cameron, archt., 1519 Transit Tower Bldg., soon lets contract, remodeling existing 3 story commercial into 3 floors of offices and addn. of 3 storys above for addnl. offices. $300,000. CD 9/23.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

† **Pine Bluff Sand & Gravel Co.**, foot of Nebraska St. Pine Bluff, Ark., CA, **$658,901**, repair standard dikes and revetment Missouri River Kensler Bends, Neb. to Sioux City, Ia., Inv. 25-066-55-31; IOWA and NEBRASKA. U. S. Eng., 1709 Jackson St., Omaha, Neb. Bids Sept. 10. CD 9/16, under LB.

▲ **MISSOURI**—State Hy. Dpt., Jefferson City,
R. G. Aldridge Contr., 1610 Nebraska St., Kansas City, Kan. LB **$765,965**. c. conc. 6.464 mi. Phelps Co.;

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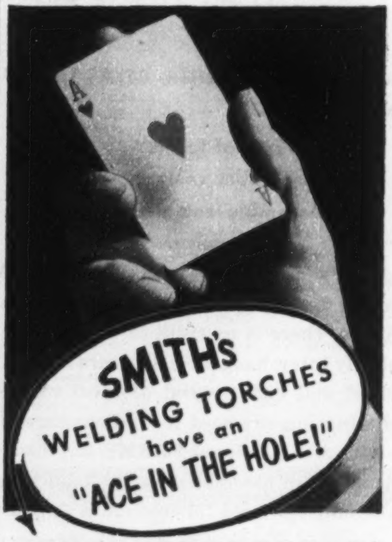

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Cameron Joyce & Co., 19 S. Seventh St., Keokuk, Ia. LB **$880,769**. c. conc. 8.366 mi. Clay Co.; LB **$128,242**. 24 ft. c. conc. 1.115 mi. Clay Co.;

Orco Contg. Co., Kirkwood, Mo. LB **$60,884**. stabilized aggregate on rolled stone base, double seal coat, Franklin Co.;

Jas. L. Pohl Contr., Nevada, Mo. LB **$60,005**. crushed stone surf., Bates Co.;

Midwest Precote Co., 7618 E. 17 St., Kansas City, Mo. LB **$101,499**, b. conc. 20 ft., 24 ft., 6.811 mi. Daviess Co.; LB **$246,823**, b. conc. 20 ft., 24 ft., 8.003 mi. Daviess Co.; LB **$123,437**, b. conc. 24 ft., 20 ft., 4,365 mi. DeKalb Co.;

Koss Constr. Co., 205 Farm Bureau Bldg., Des Moines, Ia. LB **$74,754**. 22 ft. c. conc. 0.398 mi. Audrain Co. Bids Sept. 22. CD 9/9.

E. W. Bacharach, Rialto Bldg., Kansas City, Mo. CA **$511,675**. installing filter equip. water plant expansion, KANSAS CITY, MO. City, Melvin P. Hatcher, water dir., City Hall, Kansas City, Mo. Bids Sept. 8, awarded Sept. 17. CD 9/22.

Lock Joint Pipe Co., Turner, Kan. CA **$837,350**. 14 mi. rein.-con water main, 18,210 ft. 36 in., 56,000 ft. 24 in. to Mid-Continent International Airport, KANSAS CITY, MO. City, c/o Wm. I. Hornbuckle, purch. agt., Melvin P. Hatcher, water dir., City Hall, Kansas City, Mo. Haskins, Riddle & Sharp, Finance Bldg., Kansas City, Mo., engrs. CD 5/24.

ARKANSAS—State Hy. Dpt., Little Rock,

Interstate Constr. Co., 127½ Main St., Pine Bluff, Ark., CA, **$114,894** 11.31 mi. State Hy. 73, Marked Tree-Parkin, Poinsett Co.;

Buc-Ton Constr. Co., Hazen, Ark., CA, **$661,959** 6.277 mi. and remodeling 16 bridges State Hy. 67, Pocahontas-Corning, Randolph Co.;

Ben M. Hogan & Co., 1100 Fairview St., Little Rock, Ark., CA, **$179,470**, 10.513 mi. State Hy. 143, Lepanto-Black Oak, Craighead and Poinsett Counties;

S. M. Dixon, Warren, Ark., CA, **$140,956**, grading, minor drainage structure, 3 bridges State Hy. 4, Monticello-McGehee, Desha Co.;

McGeorge Contg. Co., foot of Nebraska St., Pine Bluff, Ark., CA, **$75,602**, 5.927 mi. State Hy. 39, Brinkley-Hunter, Monroe Co. Grand total $1,172,881. Bids Sept. 23. CD 9/16.

A. M. Lipp Constr. Co., Princeton, Minn., CA **$347,800**, power lines, Dewey Co., SOUTH DAKOTA. Moreau-Grand Electric Co-operative, Timber Lake, S. D. CD 6/24.

† **Condon-Kiewit Co.**, 4229 Lafayette Ave., Omaha, Neb. LB **$645,739**, constr. and repair standard dikes and revetment at Missouri River at Lower Black Bird-Upper Decatur Bends, near Decatur, Inv. 25-066-55-30, NEBRASKA. U. S. Eng., 1709 Jackson St., Omaha, Neb. Bids Sept. 24. CD 9/14.

KANSAS—State Hy. Comn., Hutchinson,

E. W. Geiger, Inc., First and Topeka Sts., Topeka, Kan. CA **$180,867**. Bridge 54-8-8.6, Sta. 458 plus 75, 105 ft., three 133 ft., 105 ft. continuous plate girder, Proj. 54-8 F 038-3 (7), Butler Co.; and Bridge 4-80-19.3 Sta. 225 plus 00, three 7x6x48 ft. Proj. 4-80 S 969 (3) Part I, Rice Co.;

List & Clark Constr. Co., 729 Railway Exchange Bldg., Kansas City, Mo. CA **$122,742**. bridge Sta. 43 plus 35, 70 ft., five 88 ft., 70 ft. steel beam spans, Proj. 87 S 48 (2), Sedgwick Co.;

King Constr. Co., Hesston, Kan. CA **$99,576**. bridge Sta. 9 plus 00, 64 ft., 80 ft., 64 ft., steel beam, Proj. 96 S 205 (1) and bridge Sta. 13 plus 70, 60 ft., two 70 ft., 60 ft., steel beam, Proj. 96 S 206 (1), Sumner Co. Grand total $403,184. Bids Sept. 17. CD 9/2 and 9/2, under Streets and Roads.

KANSAS—State Hy. Comn., Hutchinson,

Southwest Sand & Gravel Co., Great Bend, Kan. CA **$193,020**. A-B base course, single asph. surf. tr. 8.515 mi. Proj. 5 S 60 (3), Barton Co.;

Broce & Smith Contractors, Inc., Larned, Kan. CA **$108,440**. A-A base bit. sealing 11.131 mi. Proj. 93 S 44 (6), Stafford Co.;

Stannard Constr. Co., 519 S. Broadway, Witchita, Kan. CA **$109,441**. c. conc. 0.224 mi. and 0.76 mi. Proj. 50N-5 U 062-2 (11) Parts I and II, Barton Co.;

E. W. Geiger, Inc., First and Topeka Sts., Topeka, Kan. CA **$92,225**. grading 8.753 mi. and 0.405 mi. Proj. 4-80 S 969 (3) Parts I and II, Rice Co.;

J. H. Shears' Sons, Inc., Hutchinson, Kan. CA **$160,614**. base course, sheet asph. surf. course 0.35 mi. Proj. 96-78 K 5248 (1), Reno Co., and 2.12 mi. Proj. 505-78 K 5249 (1), Reno Co. Grand total $663,740. Bids Sept. 17. CD 9/2.

KANSAS—State Hy. Comn., Norton,

Mosbarger & Ems Constr. Co., Arapahoe, Neb. CA **$113,360**. grading 5.944 mi. Proj. 27-12 S 901 (3), Cheyenne Co.;

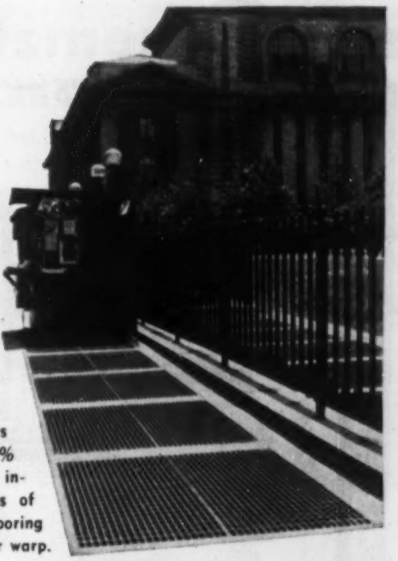
Harry Henery, Inc., Ottawa, Kan. CA **$118,255**. grading 4.475 mi. Proj. 9-20 S 522 (5), Decatur Co. Bids Sept. 16. CD 9/2.

Acme Constr. Co., Bethany, Okla., CA **$69,062**, est. $77,550, water main extens. Cassidy Heights, OKLAHOMA CITY, OKLA. City, City Hall, Oklahoma City, Okla. M. B. Cunningham, Oklahoma City, Okla., city engr. Awarded Sept. 21. CD 7/7/53.

Boecking Constr. Co., 2810 N. McArthur St., Oklahoma City, Okla., CA **$59,735**, est. $60,860, concrete paving S. W. 52 St. from Blackwelder to Penn Sts., OKLAHOMA CITY, OKLA. City, City Hall, Oklahoma City, Okla. W. W. Baker, Oklahoma City, Okla., city engr. Awarded Sept. 21.

Alpha Constr. Co., Tuloma Bldg., Tulsa, Okla. LB **$438,847**, 583 mi. pole telephone lines, Fredericksburg, TEXAS. Hill Country Telephone Co-operative Lines, Fredericksburg, Tex.

† **Hoeppner Constr. Co.**, 2026 Gilbert St., Wichita Falls, Tex., LB **$218,068**, est. $207,832, bachelor officer quarters, Abilene Air Force Base, ENG-41-443-55-14, ABILENE, TEX. U. S. Eng., 100 W. Vickery St., Fort Worth, Tex. Bids Sept. 22. CD 9/1.



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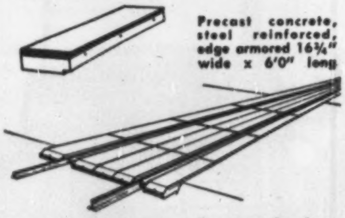

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Mischer-Harris Constr. Co., Inc., 6925 Navigation Blvd., Houston, Tex., CA **$36,000**, c.i. water lines, Second Unit, near Aldine, Tex. R. F. Beeler & Assocs., 4574 Griggs Rd., Houston, Tex. CD 8/19.

Mischer-Harris Constr. Co., Inc., 6925 Navigation Blvd., Houston, Tex., CA **$67,118**, sanitary sewer collection lines; CA **$64,129**, storm sewers, open drainage for Second Unit, near ALDINE, TEX. R. F. Beeler & Assocs., 4574 Griggs Rd., Houston, Tex. CD 8/19.

Mischer-Harris Constr. Co., Inc., 6925 Navigation Blvd., Houston, Tex., CA **$37,389**, building area grading, earthwork, Second Unit, near ALDINE, TEX. R. F. Beeler & Assocs., 4574 Griggs Rd., Houston, Tex. CD 8/19.

Mischer-Harris Constr. Co., Inc., 6925 Navigation Blvd., Houston, Tex., CA **$73,185**, constr. and asph. paving new streets, concrete curbs and gutters, near ALDINE, TEX. R. F. Beeler & Assocs., 4574 Griggs Rd., Houston, Tex. CD 8/19.

Texas Bitulithic Co., N. W. 5th St., Fort Worth, Tex. LB **$145,175**, est. $200,000, asph. paving E. Berry St., FORTH WORTH, TEX. City, City Hall, Fort Worth, Tex. Bids Sept. 17. CD 9/9.

City, City Hall, Fort Worth, Tex., rejected bids Aug. 27, storm drainage, Wheeler St., FORT WORTH, TEX. LB **$76,685**. CD 8/25, under LB.

M & N Constr. Co., Box 12306, Houston, Tex., LB **$131,996**. asph. paving 69th St., S. Barber Dr. to Harrisburg Blvd., HOUSTON, TEX. City, City Hall, 900 Brazos St., and Harris Co., Court House, Houston, Tex., John G. Turnery, 2502 S. MacGregor Way, Houston, Tex., engr. CD 7/30.

▲ **Barksdale & LeBlanc**, P. O. Box 567, Baton Rouge, La. CA **$1,987,055**, Lots 1 ,2, 3, 5, Moore Airfield rehabilitation, runways, underground utilities, etc. everything except Auxiliary Fields Nos. 1 and 2;

Heldenfels Bros. Box 1917, Corpus Christi, Tex., CA **$494,000**, all work at Auxiliary Airfields Nos. 1 and 2 only, MISSION, TEX. California Airways, Inc., Mission, Tex. Bids Sept. 13. CD 9/17, under LB.

† **Ottinger Constr. Co.**, 6300 Camp Bowie Blvd., Fort Worth, Tex., LB **$88,451**, est. $86,420, electronics maintenance shop, Connelly Air Force Base, ENG-41-443-55-8, WACO, TEX. **U. S. Eng., 100 W. Vickery St., Fort Worth, Tex. Bids Sept. 23.** CD 9/7.

Stolte Inc., Constructors, 8451 San Leandro St., Oakland, Calif., LB, **$458,969**, approx. 5,450 ft. tunnel through quandry ridge from Blue River, COLORADO SPRINGS, COLO. City, City Hall, Colorado Springs, Colo. Bids Sept. 15. CD 9/8.

BUILDINGS

LOW BIDS AND CONTRACTS

Sheehy Constr. Co., 1255 Larpenteur St. W., St. Paul, Minn. CA, **$538,300**. general contract county HOSPITAL, ALEXANDRIA, MINN. Douglas Co., P. L. Hintzen, aud., Alexandria, Minn. Bids Sept. 15. CD 8/24.

J. D. Harrold Co., 405 East Superior St., Duluth, Minn. LB, **$554,500**. general contract STUDENT CENTER BLDG.; LB, **$809,000**. combined bid for STUDENT CENER and DORMITORIES;

Fowler-Vernath Co., 303 S. First Ave. E., Duluth, Minn. LB, **$254,000**. general contract, DORMITORIES, DULUTH, MINN. Regents of University of Minnesota, C. A. Smith, purch. agt., 404 Admin. Bldg., Minneapolis, Minn. Bids Sept. 22. CD 8/24.

▲ **Harmon Constr. Co.**, 100 S. Indiana St., Oklahoma City, Okla. LB, **$1,477,777**. HOSPITAL addn., HANNIBAL, MO. St. Elizabeth's Hospital, Hannibal, Mo. C. L. Monnot, 3013½ Classen St., Oklahoma City, Okla., archt. Bids Sept. 9. CD 2/26/53.

▲ **Roy A. Jones**, Raytown, Mo. Owner Builds, **$1,200,000**. 100 HOUSE DEVELOPMENT on 29 acres in Chapel Valley subdivision on Blue Ridge Rd. (51 St. and Fuller Drive), near Kansas City, RAYTOWN, MO. Wadsworth Homes, Inc., 2949 Chrysler Rd., Kansas City, Kan., archt.

Peterson, Garbi & Joseph, Inc., 123 E. 9 St., North Little Rock, Ark., CA, **$700,681**, 1 story, 72,000 sq. ft., brick JUNIOR HIGH SCHOOL, LITTLE ROCK, ARK. Little Rock School Bd.. 800 Louisiana St., Little Rock, Ark. Bids July 21. CD 9/2, under LB.

Robert Dillon, Dillon Constr. Co., 3420 Jones St., Omaha, Neb. Owner Builds. **$800,000**. Dodge HOTEL, 70th and Dodge Sts., OMAHA, NEB. Jack C. Jackson, 4929 Grand Ave., Omaha, Neb., archt.-engr.

Roberts Constr. Co., Sabetha, Kan. CA **$160,000**. GRAIN ELEVATOR, DERBY, KAN. Derby Grain Co., Derby, Kan.

▲ **Massman Constr. Co.**, 20 W. 9 St., Kansas City, Mo. CA **$3,415,000**. general contract 3 story, bsmnt., penthouse POST OFFICE, KANSAS CITY, KAN. Federal Builders Inc., c/o contractor. CD 9/10, under LB.

▲ **Westinghouse Electric Corp.**, 101 W. 11 St., Kansas City, Mo. LB **$1.289,500**. TURBINE GENERATOR at Kaw Power Station, KANSAS CITY, KAN. City Bd. P. Utilities, 6 St. and Ann Ave., Kansas City, Kan. Bids Sept. 15. CD 8/31.

▲ **Wood Constr. Co.**, Mission, Kan. CA Est. **$1,000,000**. SHOPPING CENTER, incl. 19 stores, on 8 acre tract, K 10 and Martin-Switzer Lane, MERRIAM, KAN. R. J. Muntzel & Assoc., Mission, Kan. CD 9/21, under LB.

▲ **Harmon Constr. Co.**, 100 S. Indiana St., Oklahoma City, Okla. CA **$4,657,944**. general contract 12 story state OFFICE, TOPEKA, KAN. State, Dpt. Admin., State House, Topeka, Kan. Bids Sept. 16. CD 8/31.

J. M. Odom, Box 774, Austin 65, Tex., LB **$637,386**. Lamar Junior HIGH SCHOOL (Northside), AUSTIN, TEX. Austin Independent School Dist., 701 E. 11 St., Austin, Tex. Bids Sept. 21. CD 9/8.

C. C. Hinchberger, Box 134, Corpus Christi, Tex. CA **$105,000,** metal and concrete STORAGE and SUPPLY BLDG., pier fdn., concrete floor slab, CORPUS CHRISTI, TEX. National Supply Building, Omaha and Baldwin Sts., Corpus Christi, Tex.

▲† **T. C. Bateson Constr. Co.,** P.O. Box 7305, Love Field Station, Dallas, Tex., CA **$1,148,127,** est. $850,000-$2,250,000. Ordnance REPAIR SHOP, drilled pier fdn., Inv. No. ENG-41-443-55-13, FORT HOOD, TEX. U. S. Eng., 100 W. Vickery St., Fort Worth, Tex. Bids Sept. 21. CD 9/24, under LB.

James T. Taylor & Sons, Box 255, Fort Worth, Tex. CA **$661,500,** general constr.;

General Eng. Co., Box 2055, Houston, Tex. CA **$132,000,** refrigeration for COLD STORAGE WAREHOUSE, FORT WORTH, TEX. U. S. Cold Storage Corp., 500 E. 3 St., Kansas City, Mo. Bids Sept. 8. CD 9/14, under LB.

▲ **Farnsworth & Chambers, Inc.,** Box 74, Houston, Tex., LB **$1,871,000,** est. $1,850,000, Denver Harbor Junior HIGH SCHOOL, HOUSTON, TEX. Houston Independent School Dist., 1300 Capitol St., Houston, Tex. Milton McGinty, 2425 Ralph St., co-ord. archt. Stayton Nunn, 3772 Westheimer Rd., Houston, Tex., archt. H. E. Bovay Jr., M. Esperson Bldg., and Walter P. Moore, 2 Pinedale St., Houston, Tex., engrs. Bids Sept. 17.

James Martin Hill, Jr., Builder, Pasadena, Tex. Owner Builds. **$327,000,** 28 frame, brick DWELLINGS: **$309,800** 32 frame DWELLINGS, PASADENA, TEX. CD 6/7.

▲ **H. B. Kaulbach, Builder,** 122 Sharon St., San Antonio, Tex., CA **$355,000.** Group 1, 12 DWELLINGS; CA **$310,000.** Group 2, 10 brick DWELLINGS; CA **$392,500,** Group 3, 16 all-masonry dwellings, SAN ANTONIO, TEX. Grand total $1,057,500. H. B. Kaulbach, 122 Sharon St., San Antonio, Tex. CD 9/3.

▲ **Stearns-Roger Mfg. Co.,** 660 Bannock St., Denver, Colo., CA, **$3,500.000,** design and construct structural steel, 80 ft. high, 90x100 ft. POWER PLANT to house 16,500 KW. turbine generator with boiler and accessories, CANON CITY, COLO. Southern Colorado Power Co., Pueblo, Colo. CD 1/14/49.

▲ **Frank A. Preyer,** 975 E. Oxford Ave., Denver, Colo., Owner Builds, **$3,000,000,** 350-frame HOMES west of South Federal Blvd. between W. Hampden and W. Oxford Aves., Sheridan, near DENVER, COLO.

† **C. H. Leavell & Co.,** 1900 Wyoming St., El Paso, Tex. LB **$574,748.** instrumentation and standards LABORATORY, White Sands Proving Ground, Serial No. ENG 29-005-55-16, LAS CRUCES, N. M. U. S. Eng., Box 1538, Albuquerque, N. M. C. H. Page & Son, 305 W. 11 St., Austin, Tex., engrs.-archts. Bids Sept. 22. CD 9/8.

FAR WEST

BIDS ASKED—HEAVY CONSTRUCTION

† **Oregon**—BA 11/4—U. S. Eng., Pittock Block, Portland, 30-ton gantry crane, The Dalles Dam, Wasco Co., CIVENG-35-026-55-60. CD 12/23.

† **Oregon**—BA 11/30—U. S. Eng., 628 Pittock Block. Portland, main and fishwater turbine governors for The Dalles Dam Powerhouse, Serial No. CIVENG-35-026-55-64. CD 12/23.

BIDS ASKED—BUILDINGS

Calif., **Garden Grove**—SCHOOL—BA 10/21—Garden Grove School District, 11362 E. Stanford St., 1 story, reinforced brick, 38,435 sq. ft. School Project No. 4, $500,000. Kistner, Wright & Wright, 816 W. 5 St., Los Angeles, archts. CD 4/2.

Wash., **Woodland**—SCHOOL—BA 10/25—School District 404, Woodland, 5 frame, masonry combined Junior and Senior High School Bldgs. $800,000. Plans deposit $100 for general, $50 each for mechanical and electrical. Stewart & Richardson, Central Bldg., Vancouver, archts. CD 11/18.

SOON LETS CONTRACT—BUILDINGS

▲ **Calif., Anaheim**—DEPARTMENT STORE—Broadway Hale Stores, Inc., 4 and Broadway, Los Angeles, soon lets contract, 4 story, 250,000 sq. ft., rein.-con. department store. $3,000,000. Welton Becket & Assoc., 5657 Wilshire Blvd., Los Angeles, archts. CD 7/12.

▲ **Calif., Los Angeles**—DEPARTMENT STORE—Broadway-Hale Stores, Inc., 4 and Broadway, soon lets contract, 4 story, 250,000 sq. ft., rein.-con. department store, Panorama City, $3,000,000. Welton Becket & Assoc., 5657 Wilshire Blvd., Los Angeles, archts. CD 4/22.

Calif., Santa Barbara—HOSPITAL—St. Francis Hospital, Santa Barbara, soon lets contract, 4 story, 32,000 sq. ft., steel frame, concrete hospital addn. $750,000 Arthur & Ross Hutchason, 816 W. 5 St., Los Angeles, and Pereira & Luckman, 7421 Beverly Blvd., Los Angeles, archts. CD 10/3/50.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

Fisher Contg. Co., P. O. Box 4035, Phoenix, Ariz. CA **$599,310.** Lake Mead Water Transmission line, Spec. 2, LAS VEGAS, NEV. Las Vegas Valley Water Dist., 900 S. 5 St., Las Vegas, Nev. Bids Sept. 17, awarded Sept. 21. CD 9/1.

Nomellini Constr. Co., P. O. Box 1177, Stockton, Calif., LB **$277,550,** Schedule A;

T. & T. Eng. Co., 1275 E. Second St., Reno, Nev., LB **$299,680,** Schedule B for 2 airmen's dormitories, etc. utilities, etc. ENG-04-203-55-16, Spec. 3387-E and 3387-J, Stead Air Force Base, RENO, NEV. U. S. Eng., 180 New Montgomery St., San Francisco, Calif. Bids Sept. 21. CD 8/25.

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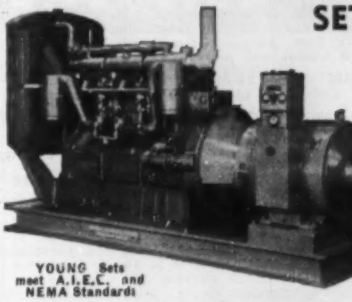

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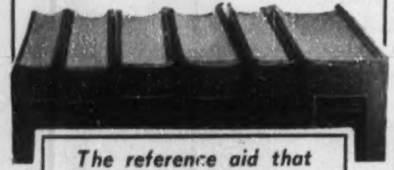

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† **Donald M. Drake Co. & Geo. A. Fuller Co.,** 1600 N.W. Savier St., Portland, Ore., LB **$497,000,** est. $537,222, multipurpose wing hangar, apron and taxiway paving, roads, parking, utilities, Larson Air Force Base, ENG-45-165-55-4, MOSES LAKE, WASH. U. S. Eng., City-County Airport, Walla Walla, Wash. Bids Sept. 22.

† **OREGON**—Bureau P. Rds., Dpt. Commerce, Morgan Bldg., Portland,

C. J. **Montag & Sons,** 7805 N.E. Halsey St., Portland, Ore., CA **$116,341,** rein.-con. approach spans and two piers for bridge to span Willamette River on Willamette Hy., Lane Co. Bids Sept. 22. Awarded Sept. 22.

† **OREGON**—Bureau P. Rds., Dpt. Commerce, Morgan Bldg.,

George E. Blaisdell & Sons, Box 619-A, Gresham, Ore., and **Steelman Duff, Inc.,** 511 N.E. Lombard St., Portland, Ore., CA **$175,803,** grade 6.865 mi. Ukiah-Starkey Hy., Umatilla and Union Counties. Bids Sept. 21. CD 9/13.

▲ **CALIFORNIA**—State Div. Hys., Sacramento,

Ukropina-Polich-Kral and **John R. Ukropina** and **Madonna Constr. Co.,** PO Box 105, San Gabriel, Calif., CA, **$1,923,764,** grade, pave 4.1 mi., constr. 6 rein.-con. bridges, Santa Barbara Co. Bids Sept. 1, awarded Sept. 16. CD 9/9, under LB.

CALIFORNIA—State Div. Hys., Los Angeles,

Geo. W. Peterson & Jack W. Baker, 6170 Santa Monica Blvd., Los Angeles, Calif., CA, **$722,657,** 4 rein.-con. box bridges, approaches, Los Angeles Co. Bids Aug. 26, awarded Sept. 15. CD 9/8, under LB.

† **CALIFORNIA**—Bureau P. Rds., Dpt. Commerce, Old Mint Bldg., San Francisco,

Oilfields Trucking Co. & Phoenix Constr. Co., P. O. Box 906, Bakersfield, Calif., LB **$486,174,** 16.481 mi. FHP-48-B2, C2, D1, E1, Sierra National Forest, Fresno Co. Bids Sept. 16. CD 9/15.

▲ **CALIFORNIA**—State Div. Hys., 120 S. Spring St., Los Angeles,

Ukropina-Polich-Kral and John R. Ukropina, P. O. Box 105, San Gabriel, Calif., LB **$1,061,539,** grading, surf., 2 bridges 4 mi. between Cypress Ave. and Rt. 43 near Fullerton, Orange Co. Bids Sept. 16. CD 8/26.

CALIFORNIA—State Div. Hys., 120 S. Spring St., Los Angeles,

J. E. **Haddock Ltd.,** 3538 E. Foothill Blvd., Pasadena, Calif., LB **$148,388.** wid'n., surf., 2.4 mi. between Torrance and Hawthorne Aves., Los Angeles Co.;

Cox Bros. Constr. Co., Box 36, Stanton, Calif., LB **$265,535,** wid'n., surf., 1.4 mi. Pacific Coast Hy. Newport Beach, Orange Co.;

W. F. **Maxwell Co.,** 534 S. Western Ave., Los Angeles, Calif., LB **$497,874,** imprv. 1.2 mi., 2 bridges, wid'n. 1 bridge San Bernardino Co. Bids Sept. 10. CD 8/16.

▲ **CALIFORNIA**—State Div. Hys., Los Angeles,

Peter Kiewit Sons' Co., 345 Kieways Ave., Arcadia, Calif., CA, **$5,960,241** 3.9 mi. Ramona Freeway between Rosemead Blvd. and San Gabriel River, Los Angeles Co. Bids Aug. 26, awarded Sept. 14. CD 9/8, under LB.

Charles A. Langlais, 474 Bryant St., San Francisco, Calif., CA, **$505,570,** traffic control sys. on lower deck of San Francisco-Oakland Bay Bridge, San Francisco and Alameda Counties, CALIFORNIA. State Div. Hys., P. Wks. Bldg., Sacramento, Calif. Bids Aug. 25, awarded Sept. 10. CD 9/1, under LB.

† **Elmer G. Wendt,** P.O. Box 606, Rio Vista, Calif., LB, **$59,322,** stone protection along Sacramento River Banks Egbert Tract, near Rio Vista, CIVENG-04-167-55-9, CALIFORNIA. U. S. Eng., Wright Bldg., Sacramento, Calif. CD 4/21/44.

▲ **Healy Tibbits Constr. Co.,** 411 Bramnan St., San Francisco, Calif., LB, **$1,124,100,** installing joint outfall submerged Pipeline No. 3, Section 1, 14,850 ft. 63- to 72-in. pipe, Joint Outfall "D" Trunk Sewer 1 and 2, Torrance, LOS ANGELES, CALIF. Los Angeles County Sanitation District No. 2, 2020 Beverly Blvd., Los Angeles, Calif. Bids Sept. 12.

Izzie Constr. Co., 4819 Arden Dr., Temple City, Calif., LB, **$531,955,** est. $500,000. Proj. 167, Nigra St. Storm Drain Unit 2 Burbank, LOS ANGELES, CALIF. Los Angeles County Flood Control District, 2250 Alcazar St., Los Angeles, Calif. Bids Sept. 17. CD 8/24.

▲† **Al-Co Company,** 5423 Flemish Lane, Los Angeles, Calif., LB, **$1,172,551,** jet overhaul shop, Norton Air Force Base, ENG-04-173-55-6, SAN BERNARDINO, CALIF. U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif. Bids Sept. 17. CD 8/11.

BUILDINGS

LOW BIDS AND CONTRACTS

† **Jacobsen Constr. Co.,** 421 13th South St., Salt Lake City, Utah, LB **$406,252,** est. $340,296, Schedule A, **$498,972,** est. $431,861, Schedule B, MICRO-METEOROLOGY BLDG., Dugway Proving Grounds, TOOELE, UTAH, U. S. Eng., 180 New Montgomery St., San Francisco, Calif. Bids Sept. 17. CD 1/12.

H. **Halvorson, Inc.,** 20054 Pacific Hy. S., Seattle, Wash., LB, **$648,417,** general contract 1 story steel frame 600-student bldg. first unit of $800,000 HIGH SCHOOL MERCER ISLAND, WASH. School Bd., Mercer Crest School, Mercer Island, Wash. Bids Sept. 22.

▲ **James I. Barnes,** 940 Spring St., Redwood City, Calif., CA, **$3,242,000.** SCHOOL BLDGS., Group 1, Area D at Bakersfield Junior College, BAKERSFIELD, CALIF. Kern County High School & Junior College, 312 Bernard St., Bakersfield, Calif. Bids Sept. 3, awarded Sept. 15. CD 9/13, under LB.

South Coast Constr. Co., 230 30 St., Newport Beach, Calif., CA, **$450,000,** 50 frame, stucco DWELLINGS, COSTA MESA, CALIF. Bay Estates, Inc., 230 30 St., Newport Beach, Calif. Hugh Gibbs, 441 E. First St., Long Beach, Calif., archt.

Stolte, Inc., 8451 San Leandro St., Oakland, Calif., LB, **$578,871,** CENTRAL GARAGE, SERVICE SHOPS, STOREHOUSE, DAVIS, CALIF. University of California, Administration Bldg., Davis, Calif. Bids Sept. 13. CD 8/26.

▲ **W. E. Robertson,** 4015 W. Jefferson Blvd., Los Angeles, Calif., A, **$1,367,500,** 112 frame, stucco DWELLINGS, Woodcrest Ave., Gage Ave., Tract 2130, FULLERTON, CALIF. Fullerton Park Homes, Inc., 4015 W. Jefferson St., Los Angeles, Calif. Max Maltzman, 4015 W. Jefferson Blvd., Los Angeles, Calif., archt.

Newhope Terrace, 1625 N. Durant St., Santa Ana, Calif., Owner Builds, **$408,800.** 56 frame, stucco DWELLINGS in Tract 2219, GARDEN GROVE, CALIF.

Pacific Coast Builders, 2530 18 St., San Francisco, Calif., LB, **$559,100,** Miramonte HIGH SCHOOL, LAFAYETTE, CALIF. Acalanes Union High School District ,Lafayette-Martinez Hy., Lafayette, Calif. Bids Sept. 13. CD 9/2.

▲ J. S. **Boespflug Constr. Co.,** 605 S. Lucas St., Los Angeles, Calif., CA, **$3,606,000,** est. $3,500,000, GARDENA HIGH SCHOOL, Gardena, LOS ANGELES, CALIF. Los Angeles Bd. Educ., 1425 S. San Pedro St., Los Angeles, Calif. Bids Sept. 10, awarded Sept. 21. CD 9/16, under LB.

P. & A. Constr. Co., 4565 Santa Monica Blvd., Los Angeles, Calif., CA, **$335,965,** AUDITORIUM, at Van Nuys Junior High School, LOS ANGELES, CALIF. Los Angeles Bd. Educ., 1425 S. San Pedro St., Los Angeles, Calif. Bids Sept. 14, awarded Sept. 21. CD 9/23, under LB.

Red Diamond Constr. Co., Inc., 122 W. Hazel St., Inglewood, Calif., CA, **$340,237,** Osage Ave. SCHOOL, LOS ANGELES, CALIF. Bd. Educ., 1425 S. San Pedro St., Los Angeles, Calif. Carey K. Jenkins, 3406 Washington Blvd., Los Angeles, Calif., archt. Awarded Sept. 21. CD 6/13/52.

E. S. **McKittrick Co., Inc.,** Box 470, Huntington Park, Calif., CA, **$100,000,** 1 story, 20,000 sq. ft., steel frame FACTORY addn., PASADENA, CALIF. Hammond Mfg. Co., 3600 E. Foothill Blvd., Pasadena, Calif. CD 8/12.

Boyce Co., 777 E. Holt Ave., Pomona, Calif. Owner Builds. **$330,000,** 29 frame, stucco DWELLINGS, Brewster, Essex Aves. and Colmar St., POMONA, CALIF.

Barnhart Constr. Co., P. O. Box 127, Santa Clara, Calif., LB, **$405,405,** Morse Ave. SCHOOL, SUNNYVALE, CALIF. Sunnyvale Elementary School Dist., Sunnyvale, Calif. **CD 8/4.**

Edbroco Constr. Co., Inc., 608 N. Catalina St., Burbank, Calif. Owner Builds, **$375,150,** 41 frame, stucco DWELLINGS in Tract 19133, WEST COVINA, CALIF.

CANADA

BIDS ASKED—BUILDINGS

Ont., **Woodstock** — SCHOOL — BA 10/15 — Bd. Educ., Woodstock, 2 story high school adjoining Northdale Public School, $500,000. Plans deposit $25. S. B. Coon & Son, 745 Mount Pleasant Rd., Toronto, archts. CD 2/11.

BUILDINGS

LOW BIDS AND CONTRACTS

▲**Kildonan Realty Ltd.,** 982 Main St., Winnipeg, Man., CA, **$3,000,000,** 400 DWELLINGS on new housing development Oxford St., TRANSCONA, MAN. Kildonan Realty Co., Kildonan, Man. CD 5/20.

▲ **Newton Constr. Co., Ltd.,** 508 Victoria St., Sherbrooke, Que., CA, **$1,939,000.** WORKSHOPS, RAILHEAD DEPOT, STORES, ENGINEERS' DEPOTS, Canadian Army Camp, FREDERICTON, N. B. Defence Contr. Ltd., 56 Lyon St., Ottawa, Ont. Bids Aug. 26, awarded Sept. 20. CD 8/4.

Les Immeubles Murdock Ltd., 7 Principal St., Chicoutimi, Que., CA, **$800,000,** 100 concrete, brick COTTAGES, CHICOUTIMI, QUE. Syndicate, c/o J. A. Hamel, Riviere du Moulin, Que.

▲ **Sir Robert McAlpine & Sons Ltd.,** 1610 Sherbrooke St. W., Montreal, Que., CA, **$1,690,700,** 2 STORAGE BLDGS., Naval Supply Depot, VILLE LA SALLE, QUE. Defence Constr. Ltd., 56 Lyon St., Ottawa, Ont. Bids Aug. 18. CD 7/29.

ALASKA

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

▲† **Peter Kiewit Sons, Co.,** 1300 Aloha St., Seattle, Wash., LB **$1,346,182,** est. $1,464,052, two 200-man masonry barracks, Ladd Air Force Base, ENG-95-507-55-19, Alaska. U. S. Eng., Anchhorage, Alaska. Bids Sept. 22.

† **Pacific Alaska Contractors,** 1515 Center St., Tacoma, Wash., CA **$969,519.** roads, streets and walks at Army Port, Inv. 55-1, Schedule A, WHITTIER, ALASKA. U. S. Eng., Anchorage, Alaska. Bids Sept. 9. CD 9/16, under LB.

LATIN AMERICA

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

† L. R. **Sommer,** 300 Granello Ave., Coral Gables, Fla. LB **$316,000,** electrical sys. addn., Joint Long Range Proving Ground, NOY 85238, Bahama Islands, BRITISH WEST INDIES. Officer in charge of Constr., NOY Contracts, P. O. Box 956, Coral Gables, Fla., U. S. A.

CONSTRUCTION REPORTS—Third Section

NEW ENGLAND

BIDS ASKED—HEAVY CONSTRUCTION

STATE HIGHWAY LETTINGS
STREETS AND ROADS
October 14 Massachusetts

▲† **Mass., Falmouth**—HANGAR—BA On Or About 10/29—U. S. Eng., 857 Commonwealth Ave., Boston, Zone 15, 250x370x65 ft. double cantilever hangar, fire protection reservoir, pumping station, Otis Air Force Base, ENG-19-016-55-33. $2,500,000-$3,000,000. Plans deposit $25. CD 6/3.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

▲ **MASSACHUSETTS**—Massachusetts Turnpike Auth., 80 Boylston St., Boston,
American Bridge Div. U. S. Steel Corp., 935 Statler Bldg., Boston, Mass. LB **$1,772,657.** superstructure steel works West Springfield and Chicopee, Contr. 51-060. Bids Sept. 28. CD 9/8.

MIDDLE ATLANTIC

BIDS ASKED—HEAVY CONSTRUCTION

STATE HIGHWAY LETTINGS
BRIDGES
October 22 Pennsylvania
STREETS AND ROADS
October 13 Maryland October 19 New Jersey
October 22 Pennsylvania

▲† **Pa., Wampum** — UNDERGROUND STORAGE — BA 11/10—U. S. Eng., 121 N. Broad St., Phila., constr. underground storage area in an abandoned limestone mine, 10 mi. south of here, for the United States Air Force. Est. $5,000,000. CD 4/16, under Public Buildings.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

PENNSYLVANIA—State Hy. Dpt., 506 N. Office Bldg., Harrisburg,
James J. Skelly, Inc., Media, Pa., CA, **$994,252**, constr. 1.23 mi. divided hy., c.. conc. pavement 24 ft. wide on each side of an earth divisor, variable to 28 ft. wide, three I-beam bridges for interchange, one over the highway, one over P. B. & W. R. R. and one under Findland Dr., roadway grading, storm sewers, constr. ramps with rein.-con. pavement Leg. Rt. 180, Chester Twp., City of Chester, Delaware Co. Bids Sept. 17. CD 9/22.

PENNSYLVANIA—State Hy. Dpt., 506 N. Office Bldg., Harrisburg,
Putman & Greene, Inc., P.O. Box 2012, Station A, Fort Wayne 3, Ind., CA **$702,003**, constr. 3.06 mi. crushed aggregate base with bit. surf., variable 36 to 46 ft. wide, incl. exten. rein.-con. structure over Webbs Run; two rein.-con. boxes; one I-beam bridge over Mahoning Creek, from Danville Boro westerly, U.S. 11, Mahoning and Point Twps., Danville Boro, Northumberland and Montour Counties. Bids Sept. 17. CD 9/22.

BUILDINGS

LOW BIDS AND CONTRACTS

▲ **J. A. Green Constr. Corp.**, c/o Benjamin Levinson, archt., 167-16 Hillside Ave., Jamaica, N. Y. Owner Builds. **$1,350,000.** 66 HOUSES, 171 St. and 73 Ave., JAMAICA, N. Y.

▲ **Oakfield Gables Homes**, c/o Alwin Cassens, Jr., archt., 145 S. Franklin Ave., Valley Stream, N. Y. Owner Builds. **$1,600,000.** 97 HOUSES, 28-acre tract, Oakfield Ave., south of Jerusalem Ave., NORTH BELLMORE, N. Y.

▲ **Windmill Farm Homes**, c/o Herman H. York, archt., 90-04 161 St., Jamaica, N. Y. Owner Builds. **$3,000,000**, 100 HOUSES, on tract both sides of Rte. 22, 2½ mi. north of Armonk, NORTH CASTLE TWP. (P.O. Armonk), N. Y.

SOUTH

BIDS ASKED—HEAVY CONSTRUCTION

STATE HIGHWAY LETTINGS
BRIDGES
October 12 North Carolina October 20 Louisiana
November 3 Louisiana
STREETS AND ROADS
October 12 North Carolina October 15 Kentucky
October 20 Louisiana

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

Eugene Simpson & Brother, 300 Montgomery St., Alexandria, Va., LB **$430,373**, Contr. A, building;
Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa., LB **$235,200**, Contr. B, furnace, for constr. of incinerator, ALEXANDRIA, VA. City, Court House, Alexandria, Va. Bids Sept. 28. CD 8/24.

▲ **Boyce & Co.**, 504 Pennsylvania Ave., Clearwater, Fla., CA, **$2,500,000**, WW imprvs., county-wide, CLEARWATER, FLA. Pinellas Co., Court House, Clearwater, Fla. Black & Assocs., Gainesville, Fla., engr.

Wiley N. Jackson Co., P. O. Box 110, Miami, Fla., CA, **$794,700**, sewage treatment plant, HOLLYWOOD, FLA. City, City Hall, Hollywood, Fla. Bids Aug. 24. CD 9/2, under LB.

BUILDINGS

LOW BIDS AND CONTRACTS

Basil Barton, Sharon Pl., Fort Thomas, Ky. Owner Builds. **$650,000.** 39 brick HOMES, Alpine Dr., FORT THOMAS, KY. Morlidge & Morlidge, 104 W. Fourth St., Cincinnati, O., engrs. Awarded Sept. 27.

MIDDLE WEST

BIDS ASKED—HEAVY CONSTRUCTION

STATE HIGHWAY LETTINGS
BRIDGES
October 14 Ohio October 19 Wisconsin
STREETS AND ROADS
October 13 Michigan October 14 Ohio
October 19 Wisconsin

BIDS ASKED—BUILDINGS

Mich., Holland—SCHOOL—BA 10/20—City, Margaret A. DePree, secy., Bd. Educ., 340 Pine St., elementary school, kindergarten, library, $600,000. Plans deposit $20, Warren S. Holmes Co., 2200 Olds Tower, Lansing, archt. CD 12/4.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

▲ **INDIANA**—Indiana Toll Road Comn., 309 W. Washington St., Old Trails Bldg., Indianapolis,
S. J. Groves & Sons, Box 31, Montpelier, O., LB **$6,739,835** Contracts, 42, 43, 44, 45, 46, 47 grading, draining, paving, etc. in La Grange Co. Bids Sept. 29. CD 9/8.

BUILDINGS

LOW BIDS AND CONTRACTS

G. A. Mossman Constr. Co., 8462 Monroe St., Rossmoyne, O. Owner Builds. **$625,000**, 34 prefabricated HOMES, Winton and McElvey Rds., CINCINNATI, O.

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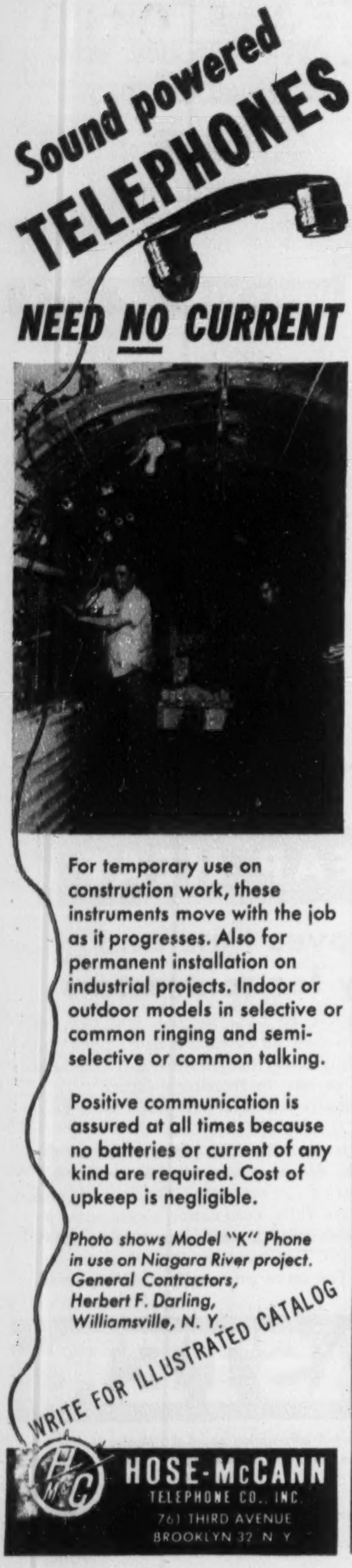

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Photo shows Model "K" Phone in use on Niagara River project. General Contractors, Herbert F. Darling, Williamsville, N. Y.

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761 THIRD AVENUE
BROOKLYN 32 N. Y.

Thomas L. Graham, 1715 Madison St., Mt. Healthy, O., engr. Awarded Sept. 25.

▲ **Lang Bros., Inc.**, 5240 Lester Rd., Cincinnati, O. Owner Builds. **$1,050,000**. forty 1½ story, bsmnt., brick HOMES, off Winton Rd.; **$690,000**, thirty 1½ story, bsmnt., brick HOMES, Edgeview Dr., CINCINNATI, O. Nunlist & Frolicher, Traction Bldg., Cincinnati, O., engrs. Awarded Sept. 27.

▲ **A. L. Jackson Co.**, 300 W. Washington St., Chicago 6, Ill., CA, **$3,300,000**, APARTMENT, De Witt Pl. and Chestnut St., CHICAGO, ILL. La Salle National Bank, 135 S. La Salle St., Chicago, Ill. Awarded Sept. 13. CD 8/16, under CA.

WEST OF MISSISSIPPI

BIDS ASKED—HEAVY CONSTRUCTION

STATE HIGHWAY LETTINGS

BRIDGES

October 14 Kansas — October 19, 20 Texas

STREETS AND ROADS

October 14 Kansas — October 15 Minnesota

October 19, 20 Texas

† **Tex., Ellington Air Force Base**—HANGAR—BA 11/2—U. S. Eng., Box 1229, Galveston, 40,584 sq. ft. A/C maintenance hangar, structural steel frame, 2 story, 14,302 sq. ft. shop lean-to, relocation of seven existing frame bldgs., utilities, etc. Inv. No. ENG-41-243-55-25. $750,000-$1,750,000. CD 9/28.

▲ **Texas-New Mexico**—PIPE LINE, BOOSTER STATIONS—Bids Asked—Standard Oil Co. of Texas, City Natl. Bank Bldg., Houston, Tex., 248 mi. products pipe line, El Paso, Tex. to Albuquerque, N. M. $3,550,000; booster station, El Paso, Tex. $250,000; booster station, Albuquerque, N. M. $275,000.

BIDS ASKED—BUILDINGS

Tex., Waco—EDUCATIONAL WING—BA 10/28—Columbus Ave. Baptist Church, 1300 Columbus Ave., 3 story, 84x105 ft., brick, frame educational wing, rein.-con. fdn. $675,000. Plans deposit $25. Walter Cocke, Jr. & Co., 1507 Franklin Ave., archt. A. C. McAdams, Majestic Bldg., and Richard A. Grimmer, W. T. Waggoner Bldg., Fort Worth, engrs. CD 7/8.

SOON LETS CONTRACT—BUILDINGS

▲ **Neb., Omaha**—BANK—Federal Reserve Bank 10 and Grand Sts., Kansas City, Mo., soon lets contract, Omaha Branch Bank addn. $1,500,000. John Latenser & Sons, 1307 Farnam St., archts. CD 4/15.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

▲† **L & M Constr. Co.**, P.O. Box 78, Memphis, Tenn., CA **$1,033,725**, est. $1,043,110, 7 dormitories, 1 airmen's mess, Blytheville Air Force Base, ENG-03-050-55-17, BLYTHEVILLE, ARK. U. S. Eng., P.O. Box 867, Little Rock, Ark. Bids Sept. 23, awarded Sept. 24. CD 9/28, under LB.

BUILDINGS

LOW BIDS AND CONTRACTS

▲ **Fred W. Ahlemeier Constr. Co.**, 620A McKnight Rd., St. Louis 14, Mo. Owner Builds. **$500,000**. fifty-six 1 story, RESIDENCES, 20,000 sq. ft. lots, Petticoat Lane subdivision north side Ladue Rd. west of Lindbergh Blvd.; **$600,000**. thirty 2 story RESIDENCES, Willow Hill subdivision, LADUE (ST. LOUIS 24 P.O.), MO.

Parsons Constr. Co., 2512 Deer Park Blvd., Omaha, Neb. CA **$765,900**. BOX FACTORY, OMAHA, NEB. Central Fibre Products Co., Omaha Div., 15 and Leavenworth Sts., Omaha, Neb. Nance & Rossie, 1504 Dodge St., Omaha, Neb., engrs. Bids Sept. 21. CD 9/9.

▲ **J. P. Wolfe Constr. Co.**, Huron Bldg., Kansas City, Kan. CA Est. **$1,100,000**. 100 HOUSE development, Hazel Grove Park, 63 and Georgia Ave., KANSAS CITY, KAN. Civic Development Co., c/o contractor.

▲ **Mission Realty, Inc.**, c/o A. C. Langworthy, Jr., Mission, Kan. Owner Builds. **$3,500,000**. 100 RESIDENCES, on 37 acres Roe Ave. and 63-65 St., incl. streets and sewers, MISSION, KAN.

▲ **Hill Electric Co.**, 2936 E. Douglas St., Wichita, Kan. LB **$1,063,470**. electrical work;
Ripstra-Turner Co., 1015 E. Douglas St., Wichita, Kan. LB **$961,013**. heating, air-conditioning and ventilation for State OFFICE, TOPEKA, KAN. State, Dpt. Admin., State House, Topeka, Kan. Bids Sept. 16. CD 8/31.

FAR WEST

BIDS ASKED—HEAVY CONSTRUCTION

STATE HIGHWAY LETTINGS

BRIDGES
October 20 California

STREETS AND ROADS
October 20, 21 California

BIDS ASKED—BUILDINGS

Ore., Pendleton—COURT HOUSE—BA 10/19—Umatilla Co., Court House, 3-story, rein.-con. court house, $750,000. Plans deposit $50. Extended date. Roald, Schmeer & Harrington, Portland Trust Bldg., Portland, archts. CD 9/17.

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

† **OREGON**—Bureau P. Rds., Dpt. Commerce, Morgan Bldg., Portland,
Fred H. Slate Co., 7805 S. W. 40th St., Portland, Ore., CA, **$971,959**, grading 20.264 mi., two concrete bridges totaling 213 lin. ft., Twin Sister Creek Rd. and South Sister Rd., Smith River area, Lane and Douglas Counties. Bids Sept. 9, awarded Sept. 23. CD 9/15, under LB.

▲ **OREGON**—State Hy. Comn., Highway Bldg., Salem,
Kuckenberg Constr. Co., 11104 N. E. Holman St., Portland, Ore., CA, **$620,567**, grading, oiling 2.29 mi. Booth Ranch-Myrtle Creek unit, Shady-Canyonville Sect. of Pacific Hy. FAP IN-78 (25), Douglas Co.;
Lebanon & Harrisburg Sand & Gravel Co., Lebanon, Ore. CA, **$139,436**, grading, paving 1.1 mi. Bear Creek sect. Suislaw Hy. FAP F-188 (4), Lane Co.;
Vernie Jarl, Gresham, Ore., CA, **$105,650**, grading, topping 4.27 mi. Ukiah-Hilgard Hy. FAP S-57 (4), Union Co.;

Warren Northwest, Inc., Box 5072, Portland, Ore., CA, **$208,205**, paving 14 mi. Lenz Rd.-Kirl Rd. unit, Mazama Junction-Lobert Sect. of The Dalles-California Hy. FAP F-320 (5), Klamath Co. Grand total, $1,073,858. Bids Sept. 23. CD 9/15.

▲ **CALIFORNIA**—State Div. Hys., P. Wks. Bldg., Sacramento,
Dicco, Inc., 1217 E. California Ave., Bakersfield, Calif., LB, **$288.682** 2.2 mi., wid'n. bridge near Bakersfield, Kern Co.;
Huntington Bros., P.O. Box 474, Napa, Calif., LB, **$170,000** 2.2 mi. Bay Hy., near Valley Ford, Sonoma Co.;
Guy F. Atkinson Co., 10 West Orange Ave. South San Francisco, Calif., LB, **$610,151**, 3.2 mi. at Visalia Airport Interchange near Tulare, Tulare Co. Bids Sept. 22. CD 9/1.

CALIFORNIA—State Div. Hys., Sacramento,
Granite Constr. Co., Box 900, Watsonville, Calif., CA, **$653,014** 1.8 mi. grade, surface wid'n. existing steel bridge near Modesto, Stanislaus Co. Bids Sept. 1, awarded Sept. 15. CD 9/9, under LB.

▲ **E. A. Irish**, 2944 Gleneden St., Los Angeles, **Johnson-Western Constructors**, 2100 Wilmington-San Pedro Road, San Pedro, and **Clyde W. Wood Sons, Inc.**, 6900 Tujunga Ave., North Hollywood, Calif., LB, **$3,269,745** constr. Project No. 1, East Compton Creek No. 1, storm drain, Cities of Bell, Huntington Park, Maywood and South Gate, LOS ANGELES, CALIF. Los Angeles County Flood Control District, 2250 Alcazar St., Los Angeles, Calif. Bids Sept. 24. CD 8/24.

BUILDINGS

LOW BIDS AND CONTRACTS

▲ **Vinnell Co., Inc.**, 1145 Westminster Ave., Alhambra, Calif., CA, **$2,000,000**, extrusion and forge bldg. for heavy press expansion, at PLANT, TORRANCE, CALIF. The Harvey Machinery Co., Inc., 19400 S. Western Ave., Torrance, Calif. Awarded Sept. 21. CD 2/3/53.

CANADA

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

Sir Lindsay Parkinson Ltd., 52 E. St. Claire Ave., Toronto, Ont., CA, **$697,092**, est. $700,000, 6 span bridge over Rideau Canal at Bronson Ave., OTTAWA, ONT. Municipality, City Hall, Ottawa, Ont. Bids Sept. 21. CD 8/24.

BUILDINGS

LOW BIDS AND CONTRACTS

▲ **Principal Investments Ltd.**, 67 Richmond St. W., Toronto, Ont., CA, **$2,000,000**, 3 story, 182x247 ft., 45,000 sq. ft. DEPARTMENT STORE, Lawrence Ave. W. near Bathurst St., TORONTO, ONT. Henry Morgan & Co., Ltd., Philips Sq., Montreal, Que. Awarded Sept. 24.

Gladmer Development Ltd., Regina, Sask., CA, **$500,000**, 18 multiple units, incl. 72 HOMES for R.C.M.P. Personnel, REGINA, SASK. Dpt. Justice, Govt. of Canada, Ottawa, Ont. CD 7/26.

ALASKA

HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

† **Chris Berg, Inc.**, 2730 Westlake Ave. N., Seattle, Wash., LB **$694,285**, est. $766,765, completing floor slabs, structural framing etc. for 69x574 ft. alert hangars, Ladd and Elmendorf Air Force Bases, ENG-95-507-55-24, ALASKA. U. S. Eng., Anchorage, Alaska, Bids Sept. 24.

LATIN AMERICA

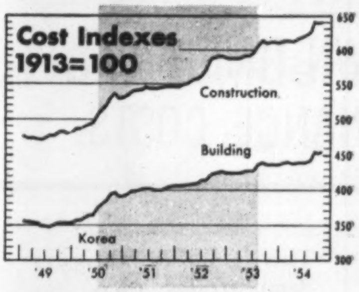
HEAVY CONSTRUCTION

LOW BIDS AND CONTRACTS

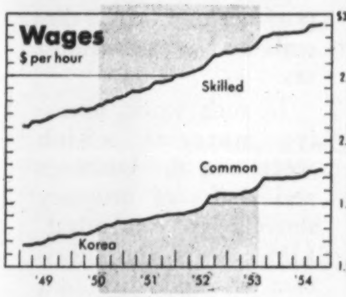
▲ **Williams Brothers**, 324 National Bank Bldg., Tulsa 3, Okla., CA Approx. **$2,500,000**. 80 kilometer pipe line between Camiri and the Argentine-Bolivia border, BOLIVIA. Yacimientos Petroliferos Fiscales Bolivians, c/o Govt. of Bolivia, LaPaz.

(Proposal Advertisements see pp. 384 to 386)

OCTOBER CONSTRUCTION SCOREBOARD

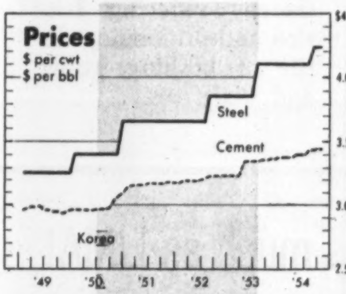


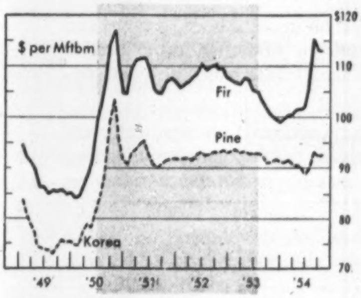
ENR INDEXES (1913=100), 20-cities' average	1954 Oct.	% Change from last Month	Year
Construction Cost	641.89	+0.2	+4.9
Building Cost	455.54	+0.3	+4.5
WAGE RATES, 20-cities' average			
Common	$2.019	+0.1	+4.5
Skilled (aver. 3 trades)	3.180	+0.3	+3.2
Bricklayers	3.455	+0.1	+2.7
Structural Ironworkers	3.154	+0.7	+3.7
Carpenters	2.932	+0.2	+3.2
MATERIAL PRICES, 20-cities' average			
Cement, bulk, per bbl	3.461	+0.1	+3.8
Structural Steel, (3-mill aver.), per cwt	4.250	0.0	+3.7
Sand, per ton	2.251	0.0	+3.1
Lumber, 2x4 Fir, per M. ft. bm	112.889	−0.1	+12.2
Lumber, 2x4 Pine, per M. ft. bm	92.967	+0.7	+2.2
Common brick, per M	33.237	0.0	+2.0
Ready-mixed concrete, per c. y	12.199	0.0	+2.2
Structural Clay Tile, 3x12x12 per M	162.115	+0.1	+1.5



CONTRACTS AWARDED (Millions)	1954 Sept. (5-Weeks)*	9-Mos.	% Change from '53 Sept. (4-Weeks)*	9-Mos.
Total U. S. (ENR reported)	$1,478.6	$10,828.2	+ 5.9	− 4.9
Private	811.3	6,168.8	+ 4.7	− 4.7
Public	667.3	4,659.4	+ 7.4	− 5.3
Federal	112.5	920.5	+ 0.3	−20.3
ENR Volume Index, '13 = 100	503	484	+ 3.3	− 6.2
NEW CAPITAL (Millions)				
Total	734.9	9,279.4	+ 4.9	− 1.0
State & Municipal Bond Sales	527.1	4,185.8	+ 45.6	+21.8
Corporate Security Sales	194.0	2,222.0	− 41.6	−36.2
Federal (non-federal work)	13.8	765.1	+118.6	−11.1
Federal (federal work)	......	2,106.5	......	+32.0

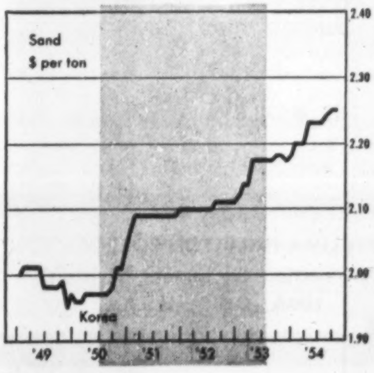
* Computed on weekly average

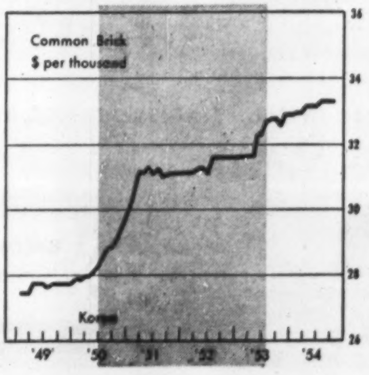


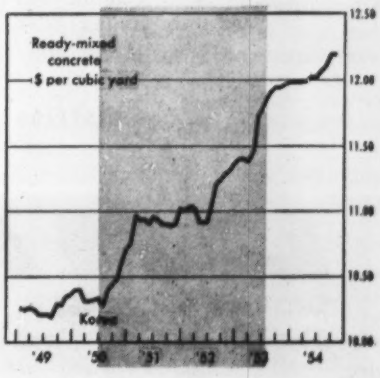


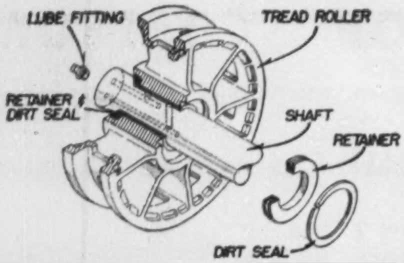
MATERIAL SHIPMENTS & LABOR SUPPLIES (millions)	1954 July (J) August(A)	7-Mos. (7) 8-Mos. (8)	% Change from '53 Mo.	Yr.-Cum.
Cement, bbls, Bu. of Mines	27.628(J)	149.856(7)	+4.3	+3.2
Fabr. Struc. Steel, tons AISC	.268(A)	2.138(8)	+6.8	+4.7
Lumber, mil. ft. bm., NLMA	3.200(J)	21.814(7)	−0.9	−6.0
Lumber Prod., mil. ft. bm., NLMA	3.052(J)	21.759(7)	−8.9	−4.8
Contract Const. Employ., BLS	2.834(A)	2.581(8)†	+0.3	+0.5

† Average

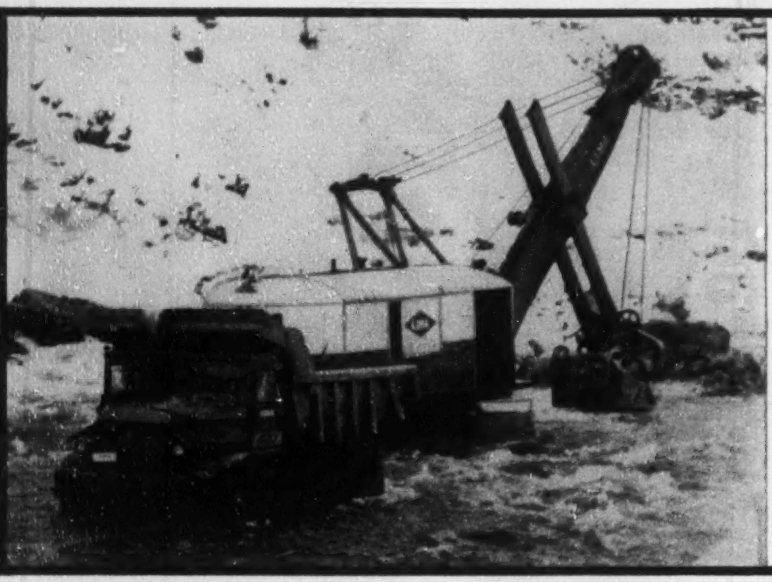








LIMA DIRT SEALS CUT DOWN-TIME AND MAINTENANCE COSTS



This LIMA shovel, demonstrates the importance of LIMA'S dirt seals and grease retainers.

In such work, abrasive material which wears out the bushings and shafts of ordinary shovels is excluded. LIMA seals the lubricant in and dirt out, thereby reducing friction and prolonging the life of bushing, roller and shaft.

COMPARE! No other machine gives you as much as LIMA!

1. Bronze bushings in tread, idler and drive rollers are protected by piston-type dirt seal rings and retainers.
2. All gears, smaller parts and shafts which are subject to extra wear are flame or induction hardened for longer life.
3. Main machinery is placed well back of center of rotation to eliminate excess counterweight.
4. Anti-friction bearings, used at all important bearing points, reduce destructive friction, fuel consumption and lubrication requirements.
5. Big capacity drums and sheaves lengthen cable life by reducing the need for double wrapping and sharp bends in cable.
6. Full air controls on travel, hoist, swing and boom hoist, result in smoother, more precise operation, minimum maintenance and less operator fatigue.
7. Torque converter (optional) automatically adjusts speed to load requirements, minimizing shock loading, making performance smoother and faster.
8. Wherever you are, you can depend on skilled service and nearby warehouse stocks of parts to keep your LIMA on the job continuously.

COMPARE and you'll specify LIMA for shovels (3/4 yd. to 6 yds.), cranes (to 110 tons) and draglines (variable).

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Construction Equipment Division
LIMA, OHIO, U.S.A.

BUSINESS AND FINANCE

Homebuilders' mood is cautious optimism

Eased FHA credit terms help to keep the boom rolling, but builders are slow about stepping up their 1955 plans

The new housing law will keep the housing boom going. However, a 10-city ENR survey of homebuilders finds most of them in a cautious mood. With some exceptions, there is not much evidence that builders have boosted fall construction plans beyond what they were late this spring, before the housing act was made law.

Most builders aren't saying anything definite about plans for 1955. Some of them say their plans haven't jelled yet. Others will tell you—and this may be much the same thing—they'll wait and see how the spring market goes.

One big reason, obviously, for the fact that fall plans haven't been stepped up is that builders foresaw the easier credit terms of the housing act for several months before it finally became law and planned accordingly.

• **FHA jam**—Another reason—one which has gotten little attention so far—is the fact that FHA commitments have slowed down sharply in recent weeks while FHA applications have piled up in local offices. Latest available FHA figures show that commitments for insurance on new units dropped from almost 37,000 in June to about 27,000 in July and less than 16,000 in August.

The reason for this paperwork jam appears to be that the FHA staff has just not been physically able to take care of this year's fast increase in applications for insurance. FHA's budget does not allow it to increase its staff suddenly to take care of quick buildups in the work load. However, Washington observers say that this isn't the whole story. They report that efficiency has been at a low ebb since investigation of FHA irregularities.

• **Buyers' market**—At any rate, builders say that they are facing a buyers' market, in spite of the easier credit terms of the new law which increase the number of potential customers. In nearly all the cities checked by ENR's reporters, builders said they were not passing along to buyers their increases in labor and material costs.

This is much the same situation as in May, when ENR made its last survey of the homebuilding market (ENR May 6, p. 21). The survey does indicate that prospective buyers now have an easier time finding mortgage lenders who will give them long-term mortgages for little or no down payment. However, a good many lenders are not going along with the easier FHA terms. Some builders think that they will unbend later on.

• **Used-home owner**—Further, there is not much indication yet that the housing law has done much to solve another big problem: the prospective new-home buyer who has an older place to sell. FHA terms used to be easier on buyers of new homes than on buyers of used ones. That made it more difficult for owners of older homes to sell them when they wanted to buy new and bigger dwellings. So the new housing act eases down payments required on purchases of used homes financed by FHA mortgages, and lengthens the allowable term from 20 years to 30.

ENR's survey does not show that builders have acquired much additional business from this type of new-home buyer. That suggests: (1) Prices of used homes are still slipping, as they have for the past three years. (2) Lenders are wary about making generous terms on older houses.

This is a very important problem that may have to be solved if the housing boom is going to continue at a rate of one-million-plus starts a year. For many of the 9,000,000 homes built since World War II are two-bedroom affairs, now too small for the families that bought them a few years ago.

The new housing law could do nothing about a third major headache that homebuilders mentioned in ENR's May survey: The fact that costs of raw land and development costs are rising faster than building costs.

• **Mortgage pattern**—In most cities which ENR surveyed, mortgage rates seem to have leveled off. There is definitely no lack of mortgage money, but rates seem to have reached a sticking place. They are not expected to go lower, but many builders expect that banks and other lenders who are not now going the full legal limit on down payments and terms will loosen up.

In most parts of the U.S., FHA and VA mortgages are selling at par or at slight discounts. In Boston, where money is traditionally about the easiest in the U. S. because of the big concentration of savings banks, some local FHA and VA paper has been bought at premiums. However, where down payments are small or non-existent, government-guaranteed mortgages generally sell below par everywhere. And if the term is 30 years, the paper is almost certain to sell at a discount. ENR's survey shows that the standard rate pattern still exists: mortgage money is easiest in the Northeast, a little less easy in the West and South.

A good many lenders are not going to the limits set by the new law for FHA mortgages. As one midwestern savings & loan official explains: "The law says you can drive 60 miles an hour. That doesn't mean everyone should drive that fast. It's simply a maximum. We take the same position."

However, there are plenty of lenders who are making more generous loans. For instance, several cities report that the proportion of FHA loans to VA loans is now 3 to 10, while it used to be 1 to 10 before the law took effect.

Some lenders will go all the way on above-grade deals. And in general the smaller institutions are less choosy than big ones. But the Bank of America—No. 1 U. S. bank, with a huge branch system in California—says it is going to lend up to the full terms allowed by the law.

• **Lending pressure**—The pressure on lenders to invest their money is obviously high. For instance, several cities report that savings & loan associations are buying more FHAs. They used to stay pretty much out of this field, except for resale to permanent lenders. That's an indication of the fast rise in savings & loan shares, which seems to be pushing S&L's out of their traditional field of conventional home mortgages.

The survey shows that rates on conventionals range widely with location and terms. The typical rate around Boston is a 4½%, with top-grade risks selling lower. In Cleveland it's around 5%, and in Miami from 4½% to 5½%. In Denver, the rate range is 5½ to 6%. But out on the West Coast, one of the high-interest areas, rates on conventionals range anywhere from 4¾% to 6%.

(B&F continued on page 378)

Construction volume goes right on climbing

Contracts set September records, as housing and highways lead the rise. Nearly all regions are sharing the gain

September heavy construction awards reported to ENR set a record for the month, averaging on a weekly basis 6% above the previous high mark reached last year. Awards totaled nearly $1.5 billion, bringing the nine-months figure above $10.8 billion. The gap between 1954 awards and the same 1953 period continues to narrow. It is now only 5%, compared with a 34% drop by the end of the first quarter, and 14% for the first half.

Private work and state and local awards also set new September records. However, on the basis of average weekly awards, overall September volume was 7% behind August because of a decline in private contracts. This September was a five-week month, while August had four weeks.

• **Private work**—Mass housing rose sharply, following the August lull. Commercial building showed a slight increase, reaching the highest level so far this year. But industrial building averaged 37% under the high August volume and 13% below September '53.

• **Public works**—State and local construction contracts were 8% above August. Besides producing the best September figure on record—9% ahead of a year ago—they reached the highest level so far this year. For the first nine months of 1954, state and local volume is only 0.7% below 1954's record volume for this period.

Although federal awards were low in September, they were above the August volume. At an average of $22.5 million, they were about the same as a year ago. However, for the year to date, they trail 1953 by 20%.

Highways sparked the September surge of public works. They averaged $49.8 million, the best month so far this year and also a September record. In fact, highway volume was the second highest for any month on record. Bridge contracts maintained a high volume for the third straight month, with a weekly average of $13.5 million.

All other types of public work, except public housing and waterworks, had higher contract volume in September than in August. Public nonresidential building awards averaged $33 million. That's up 9% over August and 21% above last year. Much of the work in this category is schools.

• **Regions**—The gain in awards extended to nearly all regions of the U. S. Last month the West-of-Mississippi area joined the Mid-Atlantic and New England as regions where 1954 contracts are running ahead of 1953.

For instance, at the end of the first half, contracts awarded in the West-of-Mississippi region were 12% behind last year, but by the end of September this region was 3% ahead.

New England continues to extend its lead over 1953—now 18% above last year. The Mid-Atlantic area lost a little ground but is still 6% ahead.

The Far West continues to narrow the gap. At the end of last month, volume was only 4% under 1953, compared with a 20% deficit at the end of the first half.

The South improved its situation in September. Though volume is still off 28%, it was off 33% at the end of August, and off 41% at end of June.

Lumber and labor boosts push indexes up again

Higher lumber prices in four cities and wage increases in five have boosted October ENR cost indexes slightly, after a mild decline in September.

ENR's Construction Cost Index is 641.89, based on 1913 = 100. That's 0.2% above last month, and 4.9% over a year ago. The index is still slightly below the all-time record set in August.

The Building Cost Index is 455.54 for October, also based on 1913 = 100. This figure equals the previous record, set in August. It is 0.3% above September, and 4.5% over October 1953.

(B&F continued on page 380)

ENGINEERING CONSTRUCTION CONTRACTS—SEPTEMBER 1954

ENGINEERING NEWS-RECORD *reports continental U. S. Construction projects of the following minimum costs—Waterworks, excavation, drainage and irrigation, $34,000; other public works, $60,000; industrial buildings, $82,000; other buildings, $300,000*

Five Weeks—Thousands of Dollars (000 Omitted)

	September, 1954							U. S. Cumulative Nine Months			
	New England	Middle Atlantic	South	Mid-West	West of Mississippi	Far West	Total U. S.	1954 (39 weeks)	1953 (39 weeks)	% Change '53 to '54	Canada September 1954
Public Works											
Waterworks	3,665	767	5,229	2,744	5,940	7,004	**25,349**	**175,013**	183,519	− 5	1,837
Sewerage	2,564	7,444	6,550	10,584	4,723	3,166	**35,031**	**281,845**	334,373	−16	1,852
Bridges	5,551	27,568	15,964	6,641	5,272	6,620	**67,616**	**382,802**	507,730	−24	2,195
Earthwork and drainage	782	138	4,820	2,016	9,150	9,759	**26,665**	**207,172**	299,510	−31	5,299
Streets and roads	20,675	63,035	47,179	42,280	48,760	27,121	**249,050**	**1,443,419**	1,360,608	+ 6	8,155
Public buildings, residential	617	13,293	1,824	1,340	375	1,140	**18,589**	**182,847**	321,985	−43	2,143
Other public buildings	21,209	25,635	41,386	17,992	27,498	31,164	**164,884**	**1,323,774**	1,276,237	+ 4	26,813
Unclassified	6,125	7,775	23,359	4,043	20,430	18,396	**80,128**	**662,531**	637,902	+ 4	9,054
Total public	**61,188**	**145,655**	**146,311**	**87,640**	**122,148**	**104,370**	**667,312**	**4,659,403**	**4,921,864**	**− 5**	**57,348**
Federal government (included in above classifications)	7,006	8,442	32,948	4,252	31,063	28,824	**112,535**	**920,518**	1,154,942	−20	8,142
Private											
Bridges	....	....	....	....	....	....	....	**6,656**	7,188	− 7	....
Industrial buildings	8,321	10,407	40,520	52,324	61,395	4,990	**177,957**	**1,454,936**	2,045,741	−29	16,066
Mass housing	6,072	136,191	38,341	130,373	96,492	23,054	**430,523**	**3,210,992**	2,759,687	+16	31,289
Commercial buildings	6,075	67,225	31,901	20,705	24,481	13,648	**164,035**	**1,014,231**	911,059	+11	21,659
Unclassified	....	400	9,997	2,123	25,436	770	**38,726**	**481,972**	750,866	−36	9,575
Total private	**20,468**	**214,223**	**120,759**	**205,525**	**207,804**	**42,462**	**811,241**	**6,168,781**	**6,474,541**	**− 5**	**78,589**
Total Engineering Construction:											
September, 1954—5 weeks	**81,656**	**359,878**	**267,070**	**293,165**	**329,952**	**146,832**	**1,478,553**	....	....	....	**135,937**
August, 1954—4 weeks	49,892	363,869	124,073	208,066	327,305	197,746	**1,270,951**	....	....	....	365,212
September, 1953—4 weeks	37,129	344,200	198,630	219,656	237,833	79,124	**1,116,572**	....	....	....	73,647
Nine Months—1954	**575,624**	**2,791,479**	**1,480,137**	**2,233,858**	**2,472,237**	**1,274,849**	....	**10,828,184**	....	**− 5**	**1,289,412**
Nine Months—1953	489,849	2,632,055	2,063,879	2,490,159	2,388,907	1,331,556	....	....	11,396,405	....	788,863
% Change '53 to '54	+18	+6	−28	−10	+3	−4	....	....	....	....	+63

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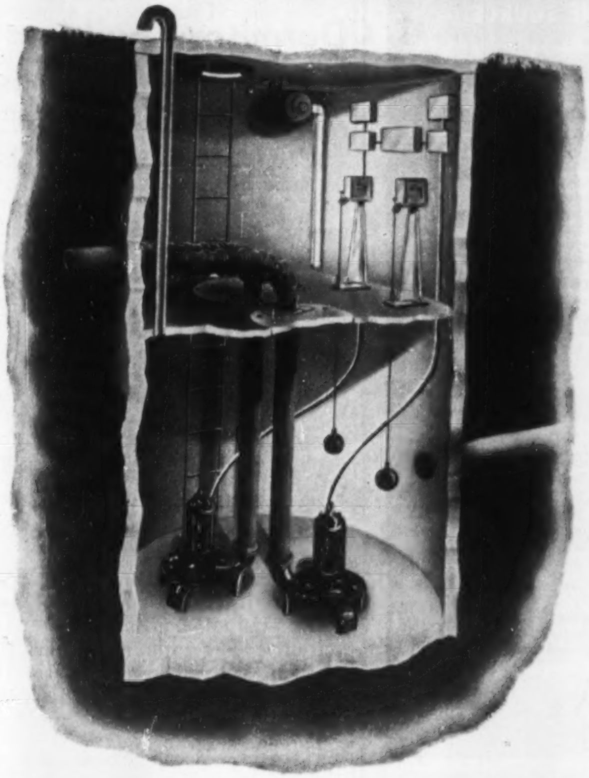

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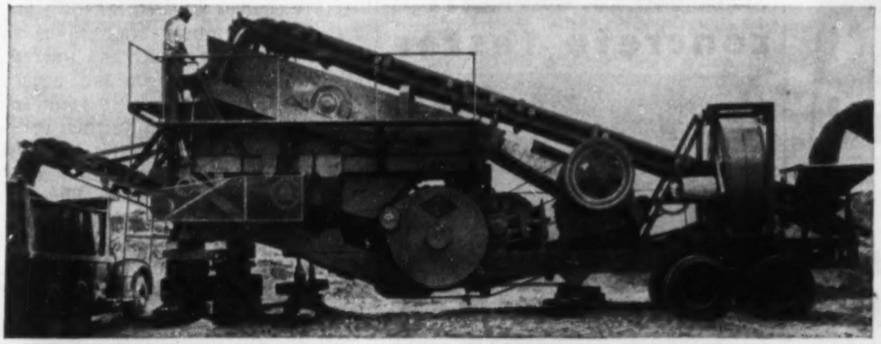

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Dormitory building

It could be big business during the next few years

If bond-market conditions remain favorable for the next few years, more than $600 million of construction financing for college dormitories could develop out of the government's college housing program, Housing & Home Finance Agency officials believe.

Right now, with plenty of funds available for investment, private interest in these long-term revenue bonds is growing. In order to capitalize on this trend, HHFA has been reshaping regulations to encourage private financing.

Congress originally set up this dormitory program in 1950 with a $300-million authorization, but Korea delayed actual lending until July 1951. Since then, the agency has committed nearly $110 million, leaving $190 million of lending authority. Under the program, state-supported and private colleges can sell long-term revenue bonds to HHFA, backed by dormitory rentals and other security.

• Private bids—The interest rate HHFA charges is based on the going rate for government bonds, plus an added charge for service and reserves. About two years ago, the agency started requiring colleges to see if any private demand existed for their issues at comparable interest rates before it would consider buying their bonds.

Colleges are required to advertise for private bids and to accept any bids that named a rate up to 1/10% higher than the going HHFA rate. This has led to investors buying about $50 million of tax-exempt bonds issued by state colleges.

Lately, HHFA has revised its rules to encourage more buying by private investors. It has boosted the differential between its interest rate and the maximum private rate to ¼%. HHFA now is charging 3¼%, but private investors can bid up to 3½% for the bonds.

Also, since January of this year investors have had the privilege of bidding on the earlier maturities of serial bond issues, if they wish, leaving the later serials for HHFA. The bidder can make an offer for all of the maturities up to 20 years, or all maturities up to 30 years. In addition, the colleges must promise that they won't call any bonds for redemption until at least 10 years after issue.

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pensation was sold last February. Two Denver investment houses picked up all maturities up to 20 years in an issue for Western State College at Gunnison, Col. Since then, however, investors usually have decided to buy the whole issue, even if it ran to 40 years. The latest big one was a $3.4-million issue of University of Texas.

• **Selling HHFA portfolio**—Before long, some money will be flowing back into HHFA's revolving fund. Investment bankers have been inquiring about some of the issues HHFA now owns—particularly finished projects with a year or more of operating experience. Before it sells any of its portfolio, however, HHFA plans to work out a selling procedure with the Investment Bankers Assn. Also, it will give the colleges which issued the bonds a chance to buy them back.

Business briefs . . .

• **Clark Equipment Co.**, of Buchanan, Mich., maker of construction and materials handling equipment has acquired a torque converter line from Torcon Corp., of Ashtabula, Ohio. Clark is acquiring inventories, engineering designs, tools, patents and other assets, but is not acquiring capital stock or liabilities. Production will be transferred to Clark's transmission plant at Jackson, Mich.

• **Ohio highways**—Ohio has just sold its initial $30-million block of an authorized $500-million highway issue at an interest cost of 1.38%. The issue must be entirely sold by 1962, with not more than $125 million sold in any year. Underwriters were willing to bid low, because the bonds are secured by state gasoline and truck taxes.

• **Northern States Power Co.** has just borrowed $20 million in 30-year bonds to help finance construction. Underwriters bid 3.03% for the issue.

• **Havana toll tunnel** is being planned to open up a new residential area across the bay from the business district. A private corporation, Havana Tunnel Development Co., has been formed to build the $25-million tunnel. Coverdale & Colpitts; Skidmore, Owings & Merrill; Raymond Concrete Pile Co., and Palmer & Baker are working on the project.

• **Biggest rural telephone loan**—Rural Electrification has just made a $3.6-million loan to the North Florida Telephone Co., at Live Oak, Fla.

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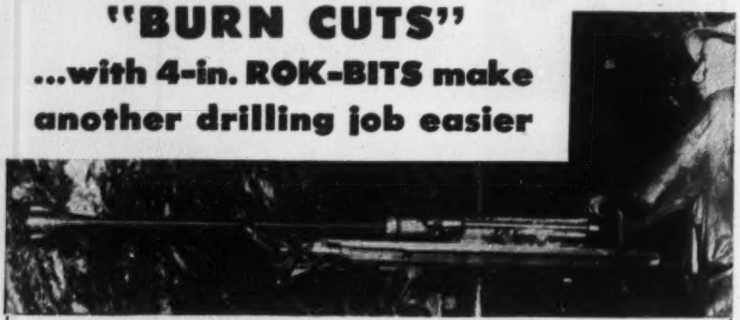

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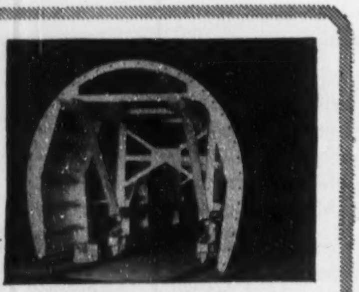

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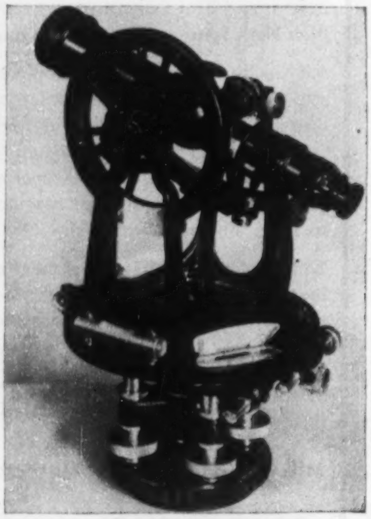

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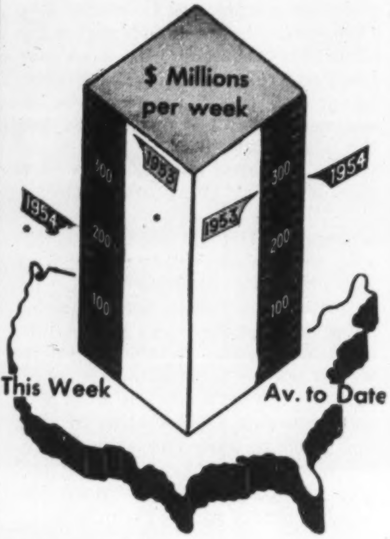
Activity This Week

As reported to ENR (In millions of dollars)



*1954 Figures=4-day week

Amount of contracts let

(millions of dollars)

	This Week	Cumulative 40 wks 1954	Cumulative 40 wks 1953	% chge
Federal	$30.1	$950.7	$1,180.1	—19
State and municipal ...	70.1	3,809.0	3,865.6	—1
Total public....	100.2	4,759.7	5,045.7	—6
Total private...	92.7	6,261.4	6,733.3	—7
U. S. total.....	$192.9	$11,021.1	$11,779.0	—6

Contracts by type of work

	This Week	1954	1953	% chge
Waterworks	$9.8	$185.0	$187.4	—1
Sewerage	3.8	285.5	339.0	—16
Bridges	5.6	394.7	525.4	—25
Highways	30.3	1.473.7	1,399.2	+5
Earthwork, waterways ...	16.0	223.0	300.8	—26
Buildings:				
Public, excl. hsg.	25.4	1,349.7	1,319.9	+2
Housg., public.	1.7	184.7	327.2	—44
Housg., private	71.3	3,282.1	2,849.7	+15
Commercial ..	5.3	1,019.2	922.9	+10
Industrial ...	10.8	1,466.0	2,195.9	—33
Unclassified	12.9	1,157.5	1,411.6	—18
Total	$192.9	$11,021.1	$11,779.0	—6

NOTE. Minimum size projects included are: Waterworks and waterways $34,000; other public works, $60,000; industrial buildings $82,000; other buildings $300,000.

New capital for construction

(millions of dollars)

	Week of Sept. 30 1954	Cumulative 39 Wks	% chge '53-'54
Corporate securities......	$51.4	$2,222.0	—36
State and municipal:			
All except housing.....	82.1	4,094.8	+27
Housing	...	91.0	—57
Federal loans	...	92.1	+3
Federal aid	...	673.0	—13
Total non-federal	$133.5	$7,172.9	—8
Federal appropriations:			
In U. S.............	...	$2,073.3	+32
Outside U. S..........	...	33.2	+15
Total new capital........	$133.5	$9,279.4	—1

ENR cost and volume indexes, 1954

		Base years = 100 1913	1926	1949
Construction cost ...	9/30†	641.89	308.56	134.56
	9/2†	640.68	307.97	134.31
Building cost	9/30†	455.54	246.25	129.49
	9/2†	454.57	245.57	129.13
Volume	Sept.	503	204	145
	Aug.	525	213	152

†Official monthly indexes for Oct. & Sept.

Building trades fear "outside" jobless

Feel influx from other fields might cut gains—study of statistics indicates industry possesses ability to adjust

An ENR Staff Report

Close observers of the labor scene this week were sure that there was a serious factual key behind the obviously increased political interest of major construction unions, as shown at their annual sessions in Los Angeles (ENR Sept. 30, p. 25).

That key goes far beyond what can be put down as pure politics—the techniques of criticizing the administration in power simply because it offers an obvious target; of espousing the obviously popular cause of full employment and plenty of federal government largess.

It is the realization that unemployment in other labor fields historically has had the effect of increasing the construction labor market. The old saw that "you can always dig a ditch" has more than a little truth in it: many a workman from another field feels he has enough familiarity with use of tools to qualify as a construction worker; many a householder feels the same way, after some years of "do-it-yourself" work at his home.

And it was obvious in the attitude of labor leaders at Los Angeles that their concern is not with immediate unemployment (of which there is little) in the building trades, but the influx of other men if unemployment increases elsewhere. Such an influx would make it difficult to hold the line on the present high level of wages, and of union organization.

Those fears are implicit in the demands for increased public works, for insurance of bargaining agreements and welfare benefits, that came out of the West Coast last week.

• **A look at the record**—A careful study of available statistics on the construction labor force bears out the fears of the labor leaders to some extent, but does not give nearly so black a picture as has been sketched in.

Census figures over an 80-year period (to 1950) indicate that the construction labor force is extremely sensitive to national economic trends; is in close relationship in numerical strength with the population figures; that location of members of the skilled trades throughout the nation remains fairly stable. In a word, the census figures show the pattern of a service industry, that depends for its existence on the demands of the local population.

Principal weakness of the industry lies in the comparatively low income and the historically unsteady working conditions of some of the principal trades.

• **Distribution** — Not unexpectedly, 53% of all of the nation's skilled workers and 45% of its building tradesmen are found in the northeastern states (New England, Middle Atlantic and East North Central) where 46% of the total population is congregated.

Unlike the situation prevailing in some other labor fields, such as the printing trades, the other areas of the country contain about the same proportion of building tradesmen as they do of the general population.

The southern states have 31% of the population and 30.8% of the building tradesmen; western states 23% and 24%. Figures for the most populous states of each area show about the same uniformity, although California has slightly more than its share of building tradesmen: New York with 9.8% of the population has 9.1% of all the building tradesmen; Texas, 5.1% and 5.5%; California, 7.0% and 8.3%.

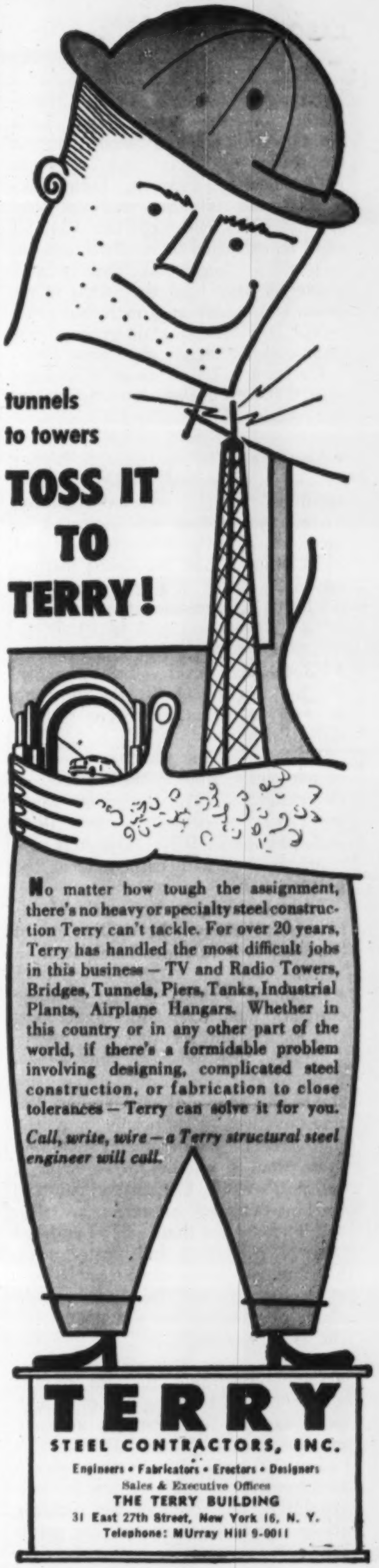
But within the building trades, this uniformity does not appear. New York has 7.2% of the nation's carpenters, 11% of its painters and 4% of its cement masons; Texas has 6.9% of the carpenters, 5.7% of the painters and 8.8% of the cement masons; California has 8.7% of the carpenters, 9.2% of the painters and 14% of the cement masons.

Occupationally, the largest building trade is the carpenters with 985,400 members. Cement masons are one of the smallest groups, 32,700. Painters (431,100) and electricians (324,000) are among the larger groups.

Most of the building tradesmen are in the construction industry, but substantial numbers (except plasterers, roofers and paper hangers) are found in a variety of other industries.

• **Growth**—Roofers, plumbers and electricians are among the trades with the

(*Continued on page 384*)



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fastest growth since 1900. Stonecutters on the other hand, have rapidly declined and paper hangers are back to where they were in 1900. During 1930-40, both electricians and plumbers suffered substantial losses, although the 1940-50 gains far exceeded these. Brickmasons, carpenters, sheetmetal workers and plasterers have held their own in relation to population growth, but none except the sheetmetal workers has experienced a steady gain since 1900.

Carpenters fell from a 1930 high of 920,100 to a 1940 low of 766,100 but rose in 1950 to 985,400.

- **Age level**—The increasingly higher age level of skilled workers is also apparent. In 12 selected building trades, the median age increased in nine, fell in three between 1920 and 1950. Roofers had the lowest median age—36.4—which is a drop from 38.5 in 1920. Carpenters stood at 43.6 (47.0 in 1940 and 42.8 in 1920).

- **Educational level** — Educationally, the building trades do not show up as well as other members of the skilled labor force.

Median for the force is 9.3 years of schooling. Among the highest are electricians (11.1), sheetmetal workers (10.1), structural workers (9.4) and plumbers (9.3). The rest are relatively low, with carpenters at the bottom—8.1.

Most building trades show little relationship between the median age of the trade and its educational level.

- **Financial security**—There is some correlation between educational level and income and security.

Trades with relatively low educational levels are comparatively unstable, as a source of work and are less remunerative. Electricians fare the best—median income over $3,200 and more than ¾ of the men getting a full year's work. Carpenters, painters, brickmasons and plasterers are near the bottom—less than $3,200 and less than ¾ getting a full year's work. Sheetmetal workers come close to both of the medians and the plumbers were above the income but did not exceed the work median.

- **Self employment**—Because of the nature of the building trades a high percentage of its members are self-employed.

In 1950 only 10% of the nation's male employed craftsmen were self-employed, but seven of the building trades equalled or bettered this: painters, 31%; carpenters, 18%; plasterers and cement masons, 16%; plumbers 16%; brickmasons 15%; electricians 10%. Sheetmetal workers trailed with 6% and structural workers with 2%.

See precedent set in NLRB picket rule

A recent NLRB ruling that imposes new limitations on union rights to picket a construction job is seen as a major point of consideration for construction men.

In a case involving painting contractors and their employes in Georgia, a majority of the board held that ordinarily lawful picketing had been rendered illegal because of previous illegal picketing activities of the union.

The matter involved Local 1730 of the Painters, and the Georgia State Council of the Painting and Decorating Contractors Assn. of America. According to testimony, the union had first picketed the whole job on which its men had been working, then changed its placards to name the specific subcontractor against whom their grievance was directed.

An NLRB majority held that the first illegal instance of picketing thus made the second illegal. A two-man NLRB minority, however, protested that the decision "goes further in prohibiting picketing of a primary employer at a common site . . ." than any previous decision. The minority contended that in order for the union to have complied with the apparent intent of the majority, it would have had to persuade other employes to cross its picket line.

Many observers looked on the decision as another in a series of NLRB actions over the past nine months that have had the effect of strengthening the position of employers in relation to their labor forces. Among these decisions have been recognition of the right of an employer to question workers as to union affiliations, and other matters (ENR Sept. 2, p. 21).

Carpenters' dispute

Faced with an injunction hearing in Cleveland's federal court, carpenters' union officials have signed an agreement allowing members to install ready-hung doors. An NLRB suit, filed Sept. 7 in Cleveland, charged the union with a boycott in refusing to handle Gemco and Hasco doors on a 150-unit housing project in suburban Rocky River. Union officials have signed a truce with the NLRB agreeing to handle the doors pending an Oct. 4 hearing.

OFFICIAL PROPOSALS

Bids: October 17, 1954

State of New Jersey
State Highway Department
Trenton

NOTICE IS HEREBY GIVEN that sealed bids will be received by the State Highway Department for:

ROUTE S-28 (1927) ROUTE 18 (1953), SEC. 4-C

Route S-28 (1927) Route 18 (1953), Section 4-C, from Albany Street to Bishop Street; Grading and Paving, City of New Brunswick, Middlesex County, Federal Aid Project No. U-112 (5). Length 0.699 mile. The principal items of work are:

Estimated:	Roadway Items
17,273	cu. yds. Excavation—Unclassified
12,381	sq. yds. Macadam Base Course, 7" thick
12,427	sq. yds. Pavement Type MA-BC-1, 2" thick
24,227	sq. yds. Conc. Pavement Surface, Rein. 9" thick
4,449	lin. ft. Rein. Conc. Culvert Pipe
83	units Inlets & Manholes
18,346	lin. ft. Concrete Curb
	Bridge Items
629	cu. yds. Concrete in Structures
30,460	lbs. Reinforcing Steel in Structures
20,750	lbs. Structural Steel

Bids for the above will be received at the office of the State Highway Department, in the CAFETERIA, State Highway Office Building, 1035 Parkway Avenue, Trenton, New Jersey, on Tuesday, October 19, 1954, at TEN o'clock (10:00 A.M.—EASTERN STANDARD TIME), and will be opened and read immediately thereafter.

The receipt and opening of bids is subject to the proper qualification of the bidder in accordance with the provisions of the prequalification law and the regulations adopted by the State Highway Commissioner. Bidders must also submit a revised financial statement and statement of plan and equipment with their bid.

NOTE: The proposed project is a "Federal Aid Project" authorized by the provisions of Title 27 of the Revised Statutes of New Jersey and supplements and by P. L. 41, 82nd Congress, and is to be performed in accordance with the special provisions and requirements of the Bureau of Public Roads, Department of Commerce, as outlined in the specifications, which provisions require that labor be employed from lists furnished by the State Employment Service, 94 Carroll Place, New Brunswick, New Jersey. The attention of bidders is directed to the special provisions covering subletting or assigning the contract. The minimum wage paid to all common labor employed on this contract shall be $0.75 per hour. The minimum wage paid to all intermediate grade of labor employed on this contract shall be $1.00 per hour. The minimum wage paid to all skilled labor employed on this contract shall be $1.50 per hour.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of the State Highway Department, Trenton, New Jersey, and may be inspected by prospective bidders during office hours. Plans will be furnished upon payment of a fee of Ten Dollars ($10.00) which will not be refunded for each set of plans upon application to A. Lee Grover, Chief Clerk, State Highway Department, Room 139, State Highway Office Building, 1035 Parkway Avenue, Trenton, New Jersey. Bids must be made upon the standard proposal forms in the manner designated in the standard State Highway specifications and must be enclosed in sealed special addressed envelopes bearing the name and address of the bidder and work bid upon on the outside, and must be accompanied by a certified check drawn to the order of the Treasurer of the State of New Jersey for not less than ten percent (10%) of the amount of the bid, provided that the said certified check shall not be less than $500.00 nor more than $20,000.00 and must be delivered at the above place on or before the hour named. Copies of the standard proposal forms and special addressed envelopes will be furnished on application. Bids not enclosed in sealed special addressed envelopes will be considered informal and will not be opened. The right is reserved to reject any or all bids. Signed:

STATE HIGHWAY DEPARTMENT
A. Lee Grover, Chief Clerk

U. S. Government

St. Paul District, Corps of Engineers, U. S. Army 1217 U. S. Post Office and Custom House, St. Paul 1, Minnesota—Sealed bids will be received at this Office until 2:00 PM., C.S.T., 21 October 1954, and then publicly opened for Channel Improvement on Rush River, North Dakota, Near Fargo, North Dakota.

OFFICIAL PROPOSALS

Bids: October 22, 1954.

Furnishing Materials for Erection of Water Storage Tank

Sealed bids for furnishing all labor and materials for erecting an elevated Steel Water storage tank including foundations with a storage capacity of "A" 400,000 gallons and alternate "B" 500,000 gallons will be received by the Township Committee of East Brunswick Township, Middlesex County, New Jersey at the Town Hall at Old Bridge, N. J. on Friday October 22, 1954 at 8 o'clock P. M. Eastern Standard Time.

Bids will be received up to the time above stated and opened in public and read, the award if made will be made as soon as practicable thereafter.

Bids shall be made in writing on the forms included with the plans and specifications prepared by Robert J. Baier, Township Engineer, 79 North Main Street, Milltown, New Jersey, where they may be seen during regular business hours and obtained by prespective Bidders upon proper notice and payment of ten (10) dollars for each set. The deposit will be returned to contractors submitting bonafide proposals who return the plans and specifications in good condition within ten (10) days after opening bids.

Bidders are notified that under Chapter 180 of the Laws of 1926, State of New Jersey they will be required to furnish a standard form of Questionaire and financial statement containing a complete statement of the bidder's ability, financial standing and experience in performing work of the type contemplated, before such bidder can be furnished plans and specifications.

The Township, through its Engineer, may refuse to furnish such bidder,whose statement is unsatisfactory, with plans and specifications.

Each bid must be enclosed in a sealed envelope with the bidder's name and address on the outside and addressed to the Mayor and Township Committee of the Township of East Brunswick, Middlesex County, New Jersey and be accompanied with a certified check in an amount of not less than ten (10)%) per cent of the amount bid.

The Township Committee reserves the right to accept or reject any or all bids and to accept the proposal deemed to be in the best interests of the Township.

By order of the Township Committee
(Signed) Frank H. Smith,
Clerk

Bids: October 19, 1954

State of New Jersey State Highway Department Trenton

NOTICE IS HEREBY GIVEN that sealed bids will be received by the State Highway Department for:

RT. 44 (1927) U.S. 130 (1953), SECS. 9D, 11D, 14C & 15E—PLANTING Route 44 (1927) Route U. S. 130 (1953), Sections 9D, 11D, 14C & 15E, Planting, from Woodbury Creek to Berkley Road, Townships of East Greenwich, West Deptford and Greenwich, and Borough of Paulsboro, Gloucester County. Length 3.895 miles. The principal items of work are:

Estimated:	358	Trees—Deciduous
	309	Trees—Small & Flowering
	4,895	Shrubs
	415	Vines

Bids for the above will be received at the office of the State Highway Department, in the CAFETERIA, State Highway Office Building, 1035 Parkway Avenue, Trenton, N. J., on Tuesday, October 19, 1954, at TEN o'clock (10:00 A.M.—EASTERN STANDARD TIME), and will be opened and read immediately thereafter.

The receipt and opening of bids is subject to the proper qualification of the bidder in accordance with the provisions of the prequalification law and the regulations adopted by the State Highway Commissioner. Bidders must also submit a revised financial statement and statement of plan and equipment with their bid.

Drawings, specifications and form of bid, contract and bond for the proposed work are on file in the office of the State Highway Department, Trenton, N. J., and may be inspected by prospective bidders during office hours. Plans will be furnished upon payment of a fee of Ten Dollars ($10.00) which will not be refunded for each set of plans upon application to A. Lee Grover, Chief Clerk, State Highway Department, Room 139, State Highway Office Building, 1035 Parkway Avenue, Trenton, N. J. Bids must be made upon the standard proposal forms in the manner designated in the standard State Highway specifications and must be enclosed in sealed special addressed envelopes bearing the name and address of the bidder and work bid upon on the outside, and must be accompanied by a certified check drawn to the order of the Treasurer of the State of New Jersey for not less than ten percent (10%) of the amount of the bid, provided that the said certified check shall not be less than $500.00 nor more than $20,000.00 and must be delivered at the above place on or before the hour named. Copies of the standard proposal forms and special addressed envelopes will be furnished on application. Bids not enclosed in sealed special addressed envelopes will be considered informal and will not be opened. The right is reserved to reject any or all bids.

Signed:

STATE HIGHWAY DEPARTMENT
A. Lee Grover, Chief Clerk

Read the Official
Proposal Columns of
ENGINEERING NEWS-RECORD
This Week and Every Week

Bids: October 26, 1954

DEPARTMENT OF PUBLIC WORKS
KANSAS CITY, MISSOURI

Sealed proposals will be received by the Director of Public Works at his office on the 20th floor of the City Hall, Kansas City, Missouri, until

Two O'Clock P.M.
Tuesday, October 26, 1954

to furnish all labor, equipment and materials, and to perform all work necessary for the construction of the following City improvement, to-wit:

TO CONSTRUCT THREE CAISSON PIERS TO BE SUNK BY DREDGING AND PNEUMATIC WORK, FOUNDED ON BEDROCK SHALE OR OTHER SUITABLE MATERIAL, DESIGNATED PIERS NOS. 1, 2, AND 3, OF THE MISSOURI RIVER BRIDGE AT BROADWAY,

as shown on the plans, as specified herein, and as directed by the Director of Public Works.

At the time and place above mentioned, bidding will be closed and those proposals received will be publicly opened and read aloud.

Payment for this improvement is to be made in CASH, out of funds provided for this purpose.

A proposal from any contractor in default with the City on any previous contract will not be considered.

No proposal shall in any manner be conditioned and the submission of such a conditioned proposal shall cause its rejection.

A proposal will not be considered unless CASH or Certified Check in an amount equal to or in excess of five (5) per cent of the amount bid has been previously deposited with the Director of Finance and his certificate therefor accompanies the bid.

Copies of plans and specifications are on file and may be examined at the office of the Department of Public Works, 19th Floor City Hall, Kansas City, Missouri, and at the office of Howard, Needles, Tammen & Bergendoff, Consulting Engineers, 1805 Grand Avenue, Kansas City, Mo. Prospective bidders will be supplied with two sets of plans and two copies of the specifications upon payment of $10.00 to Howard, Needles, Tammen & Bergendoff. Prospective bidders who have purchased bidding plans and specifications may secure extra prints of plans at fifty cents per sheet and extra copies of specifications for $2.00 per copy.

By virtue of statutory authority, a preference will be given to materials, products, supplies and all other articles produced, manufactured, made or grown within the State of Missouri.

The Contract will be awarded to the lowest and best bidder, but the right is reserved to reject any and all proposals.

Reed McKinley
Director of Public Works
Of Kansas City, Missouri

Bids: October 11, 1954

Contract No. 1444

WASHINGTON SUBURBAN SANITARY COMMISSION
FURNISHING AND DELIVERING TRUCK MOUNTED REFUSE COLLECTORS

Sealed proposals for furnishing and delivering two (2) complete truck mounted refuse collectors will be received in the office of the Acting Purchasing Agent, Room G-11, of the Washington Suburban Sanitary Commission, Hamilton Street, Hyattsville, Maryland until 10:30 A. M. Eastern Standard Time, on Monday, October 11th, 1954 at which time and place they will be publicly opened and read.

Specifications may be obtained from S. Z. Salsberry, Actiong Purchasing Agent of the Commission, Hyattsville, Maryland.

Raymond W. Bellamy, Chairman
L. S. Ray
J. Norman Ager
Commissioners

ATTEST:
James B. Parkhill
Secretary-Treasurer

U. S. Government

Bureau of Reclamation, North Platte River District 92354-P4, Casper, Wyoming. For Immediate Release September 23, 1954. UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION. NOTICE IS HEREBY GIVEN that sealed bids on Specifications No. 703C-356 for furnishing labor and materials and performing all work for Sinclair-Hanna 34.5-Kilovolt Transmission Line, Hanna-Ft. Steele Section, Reroute for Highway Relocation, Kendrick Project, Wyoming, will be mailed to P. O. Box 280, Casper, Wyoming or delivered to the office of the Bureau of Reclamation in time for the public opening at 10:30 a.m., Mountain Standard Time, October 19, 1954, at the office of the Bureau of Reclamation, Reclamation Center, Casper, Wyoming. Copies of the standard forms and of the specifications may be obtained from the following offices of the Bureau of Reclamation: R. J. Walter, Jr., Regional Director, Building No. 46, Denver Federal Center, Denver, Colorado; and I. J. Matthews, Projects Manager, Box 280, Casper, Wyoming. No charge for copies of the specifications and drawings furnished for bidding purposes; for all others $1.00 per copy, not returnable. Payments should be made by check or money order payable to the Treasurer of the United States. I. J. Matthews, Projects Manager.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4263) will be received at Ephrata, Wash., until November 16, 1954, for furnishing labor and materials for earthwork and structures, Lateral W20, Sta. 85+50 to 428+50, West Canal Laterals, Block 89, Columbia Basin Project. Location: near Ephrata, Wash., in Grant County. Principal items are: 971,000 c.y. excavation for lateral, structures, and borrow and including 1,000 c.y. excavation, rock; 312,000 c.y. placing earth lining; 200 c.y. concrete in structures; lump sum, furnishing and installing two radial gates; 7 gates, furnishing and installing slide gates; and other work. Completion time 660 days. For particulars, address Bureau of Reclamation, Ephrata, Wash.; or Building 53, Denver Federal Center, Denver, Colo. W. A. Dexheimer, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4259) will be received at Sargent, Neb., until November 9, 1954, for furnishing labor and materials for earthwork and structures, Sargent Canal, Sta. 27+10 to Sta. 595+00, wasteways, and drains, Sargent Unit, Middle Loup Division, Neb., Missouri River Basin Project. Location near Sargent, Neb. Principal items are: 931,000 cu. yds. excavation; 1,410 cu. yds. concrete; 107 M.b.m. timber in structures; 1,878 lin. ft. concrete pipe; 20,000 lbs. metalwork; and other work. Completion time 540 days. For particulars, address Bureau of Reclamation, Sargent, Neb.; or Building 53, Denver Federal Center, Denver, Colo. W. A. Dexheimer, Commissioner.

Bids: October 21, 1954

Power Authority of the State of New York

FOR
CONSTRUCTION OF
ACCESS RAILROAD & HIGHWAYS
AND
IMPROVEMENT OF EXISTING ROADS
NEAR MASSENA, ST. LAWRENCE
COUNTY, NEW YORK
SPECIFICATION NO. PA-5-11003
ST. LAWRENCE CONTRACT NO. 4

NOTICE TO CONTRACTORS: The POWER AUTHORITY OF THE STATE OF NEW YORK will receive sealed proposals for the construction of Access Railroad and Highway and Improvement of Existing Roads near Massena, St. Lawrence County, New York, until 10:30 a.m. Eastern Standard Time on the 21st day of October, 1954 at the Authority's Office, 270 Broadway, Room 1207 A, New York 7, New York, at which time and place proposals will be publicly opened and read aloud.

The principal items of work are:

Schedule No. 1, Railroad and Highway Estimated:
365,000 cu. yds. Excavation, Railroad & Highway
355,000 cu. yds. Embankment, Railroad & Highway
9,600 lin. ft. Highway Guard Rail
1,910 lin. ft. Reinforced Concrete Culvert Pipe (various sizes)
100 cu. yds. Dry Rip-Rap
33,000 cu. yds. Bank Run Gravel
10,000 cu. yds. Bituminous Macadam
7,000 tons Asphalt Concrete, Type 3A
Schedule No. 2, Improvement of Existing Roads
3.2 miles, Clearing and Grading of Existing Roads
16,000 cu. yds. Bank Run Gravel
6,000 cu. yds. Bituminous Macadam
780 lin. ft. Reinforced Concrete Culvert Pipe (Various sizes)
5,000 cu. yds. Selected Borrow
2,700 lin. ft. Highway Guard Rail
20,000 cu. yds. Excavation
19,000 cu. yds. Embankment
Schedule No. 3, Track Work for Main Lines
8,900 lin. ft., Furnishing and Laying Track
5,000 each Furnishing and Placing Cross Ties
4,700 cu. yds., Furnishing and Placing Ballast
Schedule No. 4, Classification Yard Track Work
23,600 lin. ft., Furnishing and Laying Track
13,000 each Furnishing and Placing Cross Ties
12,500 cu. yds., Furnishing and Placing Ballast

Plans, specifications and Proposal Forms for the work are on file in the Authority's Office and in the offices of the Engineer, Uhl, Hall & Rich, 230 Congress Street, Boston 10, Massachusetts, and the Hydro-Electric Power Commission of Ontario, 620 University Avenue, Toronto 2, Ontario, and may be inspected by prospective bidders during office hours.

Plans, specifications and Proposal Forms may be obtained from the Power Authority of the State of New York, 270 Broadway, Room 1300, New York 7, New York, upon application and prepayment of a fee of Forty ($40.00) dollars per set, no part of which will be refunded.

Bids must be made upon the proposal forms included in the Contract Documents. Each proposal must be accompanied by draft or certified check payable to the order of the Power Authority of the State of New York for the Sum of $80,000.00.

The right is reserved to reject any or all bids.

W. S. CHAPIN
GENERAL MANAGER

Bids: October 28, 1954

Grade Crossing Elimination Project

Sealed Proposals for the elimination of the grade crossing at Adams or Franklin Park Road, North Brunswick township, Middlesex County, Adams, N. J., will be received by The Pennsylvania Railroad Company at the Office of Chief Engineer-Eastern Region, Room 450, Pennsylvania Station, 30th Street, Philadelphia, Pa., until 10:00 A. M., Eastern Standard Time, on October 28, 1954, at which time and place they will be publicly opened and read.

The elimination project is being constructed under an Order of the Board of Public Utility Commissioners of New Jersey.

The major items of work include the following approximate quantities:

78,000	C. Y.	Embankment
975	C. Y.	Foundation Excavation
630	C. Y.	Roadway & Ditch Excavation
9,540	S. Y.	Top Soiling
4,800	S. Y.	Macadam Base Course—9"
4,675	S. Y.	Macadam Base Course—4"
1,100	Tons	Bituminous Concrete Surface Course
303	C. Y.	Class "B" Concrete in structure
2,016	C. Y.	Class "C" Concrete in structure
210,000	Lbs.	Reinforcement Steel
390,000	Lbs.	Structural Steel
115	L. F.	30" Diameter Reinforced Concrete Culvert Pipe
1,285	L. F.	V.C. Pipe (24", 18" and 12")
500	L. F.	C.I. Pipe 12"
7	Ea.	Manholes
570	S. Y.	Bituminous Concrete Sidewalk
2,600	L. F.	Guard Fence
4,150	L. F.	Concrete Curbs
970	Gal.	Bituminous Dampproofing

The Contract Documents, including Plans and Specifications, may be examined and obtained at the Office of the Assistant Chief Engineer-Eastern Region, Room 351, Pennsylvania Station, New York City, upon deposit of Ten Dollars per set, which will be refunded upon return of the Documents in good condition within twenty days after date on which bids are received.

Each proposal must be accompanied by a certified check of the Bidder payable to the Pennsylvania Railroad Company, in an amount not less than five per centum of the Total Price stated in the Proposal, subject to the conditions provided in the Instructions to Bidders.

Proposals must be submitted in a sealed envelope marked "Adams, N. J. Grade Crossing."

The right is reserved to reject any or all bids.

The Pennsylvania Railroad Company
C. J. Henry, Chief Engineer-Eastern Region
Philadelphia, Pa.

Bids: October 22, 1954

Construction of Double Cased Deep Well

Sealed bids will be received by the Township Committee of East Brunswick Township, Middlesex County, New Jersey at the Town Hall, Old Bridge, N. J. on Friday Oct., 22, 1954 at 8 o'clock P.M. Eastern Standard time for the construction of a double cased deep well of the gravel filter type having a guaranteed production capacity, together with the furnishing and installing of a Deep Well Pump, Electric Motor Switches, Control's and appurtenances, and specified, at the Hall's Corner site for a Deep Well in the aforesaid Township.

Bids will be received up to the time above stated and opened in public and read, the award if made will be made as soon as practicable thereafter.

Bids shall be made in writing on the forms included with the plans and specifications prepared by Robert J. Baier, Township Engineer, 79 North Main Street, Milltown, New Jersey, where they may be seen during regular business hours and obtained by prospective Bidders upon proper notice and payment of ten (10) dollars for each set. The deposit will be returned to contractors submitting bonafide proposals who return the plans and specifications in good condition within ten (10) days after opening bids.

Bidders are notified that under Chapter 180 of the Laws of 1926, State of New Jersey they will be required to furnish a standard form of Questionnaire and financial statement containing a complete statement of the bidder's ability, financial standing and experience in performing work of the type contemplated, before such bidder can be furnished plans and specifications.

The Township, through its Engineer, may refuse to furnish such bidder, whose statement is unsatisfactory, with plans and specifications.

Each bid must be enclosed in a sealed envelope with the bidder's name and address on the outside and addressed to the Mayor and Township Committee of the Township of East Brunswick, Middlesex County, New Jersey and be accompanied with a certified check in an amount of not amount bid.

The Township Committee reserves the right to accept or reject any or all bids and to accept the proposal deemed to be in the best interests of the Township.

By order of the Township Committee
(Signed) Frank H. Smith.
Clerk.

Bids: October 22, 1954

Furnishing Materials for Installation of Iron Removal Filter

Sealed proposals, for furnishing all labor and materials for the erection and installation of an Iron Removal Filter together with other work in the Pumping Station, at Hall's Corner, will be received by the Township Committee of the Township of East Brunswick, Middlesex County, New Jersey at the Town Hall at Old Bridge, New Jersey, on October 22, 1954 at 8 o'clock P.M. Eastern Standard Time.

Bids will be received up to the time above stated and opened in public and read, the award if made will be made as soon as practicable thereafter.

Bids shall be made in writing on the forms included with the plans and specifications prepared by Robert J. Baier, Township Engineer, 79 North Main Street, Milltown, New Jersey, where they may be seen during regular business hours and obtained by prospective Bidders upon proper notice and payment of ten (10) dollars for each set. The deposit will be returned to contractors submitting bonafide proposals who return the plans and specifications in good condition within ten (10) days after opening bids.

Bidders are notified that under Chapter 180 of the Laws of 1926, State of New Jersey they will be required to furnish a standard form of Questionnaire and financial statement containing a complete statement of the bidder's ability, financial standing and experience in performing work of the type contemplated, before such bidder can be furnished plans and specifications.

The Township, through it's Engineer, may refuse to furnish such bidder, whose statement is unsatisfactory, with plans and specifications.

Each bid must be enclosed in a sealed envelope with the bidder's name and address on the outside and addressed to the Mayor and Township Committee of the Township of East Brunswick, Middlesex County, New Jersey and be accompanied with a certified check in an amount of not less than ten (10%) per cent of the amount bid.

The Township Committee reserves the right to accept or reject any or all bids and to accept the proposal deemed to be in the best interests of the Township.

By order of the Township Committee
(Signed) Frank H. Smith,
Clerk.

Bids: October 26, 1954

Savannah Beach Toll Road Chatham County

Sealed proposals will be received in the County Commissioners Office until 11 o'clock A. M. Tuesday, October 26, 1954 at their office in the Court House, Savannah, Georgia, for furnishing all labor, materials and other things necessary for the construction of 9.781 miles of grading, paving and bridges, located in Chatham County on what is known as the Savannah Beach Road, U.S. Route 80, beginning at the intersection of President Street and Liberty Street in Savannah and extending eastward to a point north of Bull River on the present Savannah Beach Road, including a spur from a point on Oatland Island to the present Savannah Beach Road, on Whitemarsh Island.

Plans and specifications are on file in the office of the undersigned where they may be obtained for $5.00 The work will be let in one contract.

All bids subject to approval of the U.S. Engineer as to St. Augustine Creek Bridge proposal.

The Commissioners of Chatham County and Ex-Officio Judges reserve the right to reject any and/or all bids and to waive any and all formalities in presentation of bids.

CHATHAM COUNTY BOARD OF
PURCHASE
JAMES P. HOULIHAN, CHAIRMAN
LILLIAN E. GROTHEER, CLERK
Commissioners of Chatham County
and Ex-Officio Judges"

Contractors Watch This Section —

for new projects. Publish your announcements through the proposal sections of *Engineering News-Record* and get their bids.

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(Not available for equipment advertising)

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Send NEW ADVERTISEMENTS: To New York Office W. 42nd St., N. Y. 36 for October 21st issue closing October 11th.

WANTED
Chief Soils Engineer
2 Jr. Soils Engineers

Location North Central Penna. Send complete resume, date available and salary desired in first letter.

P-4137, Engineering News-Record
330 W. 42 St., New York 36, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

JR. CIVIL Engineers, Instrumentmen, Map Draftsmen needed for expanding Highway Program in Nevada. State Personnel Department, Carson City, Nev.

SUPT. FOR Gen'l Contractor. Must be familiar with concrete construction, brickwork, etc. and capable of supervising subcontractors work. State experience, when available and salary requirements, P-3934, Engineering News-Record.

SALESMAN STRUCTURAL Steel — for established Eastern Penna. Fabricator. Must be top grade man with proven ability and broad experience. Give full particulars in reply to P-3891, Engineering News-Record.

EXPERIENCED ESTIMATOR, Graduate Engineer preferred, capable of preparing estimates, pricing, purchasing, subcontract negotiation and job management. Permanent position with well established and progressive general contractor located in Northwestern Ohio specializing in industrial and commercial buildings, public works and bridges. Send complete history including education, past experience, references and salary expected. P-3958, Engineering News-Record.

WANTED — CONTRACTOR'S Cost Engineer, background in both building construction and cost accounting desirable. Must be familiar with general phases of building construction in relation to cost keeping. Will supervise field timekeepers and cost keepers. Please give references and record of work. J. M. Odom, General Contractor, P. O. Box 774, Austin, Texas.

DRAFTSMAN WANTED — Experienced in detailing miscellaneous and/or structural steel by Bushnell Steel Company. P. O. Box 2579, Jacksonville, Florida. Reply giving brief resume of experience, education, availability, and salary expected.

STRUCTURAL ENGINEER Wanted — Experienced in designing and estimating structural steel, by Bushnell Steel Company, P. O. Box 2579, Jacksonville, Florida. Reply giving brief resume of experience, education, availability, and salary expected.

CIVIL ENGINEERS with considerable experience in highway dept. supervision, office engineering or maintenance engineering (highway and equipment) wanted for overseas project in the Near East. Salary attractive, living conditions good. Submit complete resume of experience and references. P-4023, Engineering News-Record.

CIVIL OR structural engineer; experienced in structural design for all types building construction. State age, qualifications and salary requirements. Progressive firm located in Eastern Pennsylvania. P-4059, Engineering News-Record.

WANTED: SALES-engineer or qualified person to handle sales and promotion for precast products manufacturer in central Penna. Salary dependent upon qualifications, ability, and effort expended. Reply P-4058, Engineering News-Record.

SUPERINTENDENT FOR Gen. contractor in Phila. Must have proven record as superintendent on commercial and industrial construction. State experience, salary desired & references. P-4180, Engineering News-Record.

HEAD MASTER MECHANIC
or
MECHANICAL SUPERINTENDENT
West Coast

Major, long-established Western construction firm needs Head Master Mechanic or Mechanical Superintendent to take charge of its mechanical operations. Work covers Western States and foreign countries. Job requires top ability. Must help formulate policies and organize mechanical supervision over many projects working a large fleet of heavy power shovels, heavy trucks, heavy tractors, concrete plants, and numerous other types of equipment. Headquarters California. Salary open.

Please submit complete personal information and job experience in your reply. All replies will be held confidential and will be acknowledged.

P-4172, Engineering News-Record
68 Post St., San Francisco 4, Calif.

POSITIONS VACANT

CITY ENGINEER. The City of Wauwatosa (a progressive and expanding community of forty-five thousand inhabitants, covering an area of 12½ square miles) is seeking a City Engineer to have administrative and technical charge of the municipal engineering department and allied departments. Required: a degree in civil engineerng. Wisconsin registration or eligibility thereto, and ten years of progressively responsible civil engineering experience. Maximum age 50 years. Starting salary $700 to $800 per month depending on applicant's qualifications. For further information apply before October 15, 1954 to the Wauwatosa Civil Service Commission, 7616 Harwood Ave., Wauwatosa 13, Wis.

DESIGN ENGINEER—Experience on elevated tanks and towers of modern design. Unusual opportunity with progressive eastern corporation for man with ability to assume complete charge of design, manufacture, and direct erection. P-1107, Engineering News-Record.

WANTED SOIL Mechanics, concrete and asphalt inspectors and technicians. Recent graduates with soil mechanics and concrete laboratory training may apply. Openings in field and laboratory for construction contracts of turnpikes and large engineering projects in the middlewest. Send resume to: Testing Service Corporation 710 North Brookfield Street South Bend 28, Indiana.

BRIDGE DESIGNERS and draftsmen wanted. State education, experience, and salary desired in reply. T. B. Gunter, Jr., Bridge Engineer, State Highway and Public Works Commission, Releigh, North Carolina.

NORTHERN NEW Jersey concern desires young, graduate engineer with some heavy construction experience to do field surveying and estimating. Send complete resume of experience and salary desired to P-4055, Engineering News-Record.

(Continued on the following page)

UTILITIES ENGINEER
Foreign Service

B.S. degree in mechanical or chemical engineering plus minimum five years' experience in operational and maintenance phases of steam electric power plant.

Write giving full particulars regarding personal history and work experience. Please include telephone number.

Recruiting Supervisor, Box 84

ARABIAN AMERICAN OIL CO.
505 Park Avenue New York 22, N. Y.

DESIGN ENGINEER

Wanted young engineer for basic project engineering design: Chemical processing, piping, materials handling, structures. Good starting salary. Liberal employee benefit program. State education, experience, salary and personal data. Reply to R. J. Halpin,

GRAIN PROCESSING CORP.
Muscatine, Iowa

CONTROLLER

Young, aggressive Southern firm operating in the South, Southeast, Southwest, West and Midwest desires services of a controller with construction experience. Only persons of high calibre with executive ability need apply. Reply fully giving age, education, experience, when available and salary desired.

P-4168, Engineering News-Record
330 W. 42 St., New York 36, N. Y.

District Construction Manager

Large national engineering and construction company with headquarters in the midwest seeking graduate engineer with several years varied experience in the mechanical and building phases of construction to serve as construction manager of midwestern district. Position involves the supervision and direction of project superintendents on both building and mechanical type projects, including analysis of costs and methods relating to each project. There will be considerable travel. Experience as a district construction supervisor or project manager on several large projects is desired.

Persons qualified should submit a complete resume stating experience, education and salary requirements. All replies treated confidential. Interviews arranged for qualified applicants.

P-4072, Engineering News-Record
330 W. 42 St., New York 36, N. Y.

BRIDGE ENGINEERS AND SPECIFICATION WRITERS

Civil Graduates of accredited U. S. colleges. Must have not less than the following experience:

Detailers—2 years structural steel or reinforced concrete detailing.

Designers—5 years responsible work on structural steel and concrete including work on long span bridges.

Squad Leaders—3 years responsible charge of squad on structural steel detailing.

Specification Writers—With design and field experience for writing specifications for steel bridges, concrete structures, and highway construction.

Please mail complete resume together with salary required to:

Howard, Needles, Tammen & Bergendoff
55 Liberty Street New York 5, N. Y.

Structural & Hydraulic Designers
Detailers & Draftsmen
Engineer for Field & Office—

with actual experience on sewage treatment plant structures and sewers. Include experience, date available, salary desired, in first letter to

GANNETT FLEMING CORDDRY & CARPENTER, INC.
Box 366, Harrisburg, Penna.

WANTED

2 Office Engineers—experienced setting grades for streets, sanitary sewers, storm drainage and site grading for subdivisions.
1 Map Draftsman—ink and pencil, neat and accurate.
1 Party Chief—experienced in subdivision layout and land survey.
Positions permanent—Contra Costa County, Calif.

P-4075, Engineering News Record
68 Post St. San Francisco 4, Calif.

WANTED

EXPERIENCED SALESMAN

For Heavy Construction Equipment
In Northern New Jersey
Must know Territory

SW-3880, Engineering News-Record
330 W. 42 St., New York 36, N. Y.

CHIEF ESTIMATOR CONST. ENGINEER

Complete charge estimating dept. Commercial and industrial buildings, sewage treatment and water filtration plants. Familiar with all take-offs, pricing, sub bids. Available in six weeks. Salary $12,000 per year.

PW-3902, Engineering News-Record
330 W. 42 St., New York 36, N. Y.

POSITIONS VACANT

(Continued from preceding page)

HIGHWAY DESIGN Engineers — Expansion program. Openings for designers, squad leaders, draftsmen, tracers. Large expressway project located in vicinity of Baltimore, Maryland. Furnish full information regarding education, experience, age and references. Replies confidential. Associated Consulting Engineers, 1606 Kelly Avenue, Baltimore 9, Maryland.

ENGINEERING GEOLOGIST having a minimum of 15 years experience in field and laboratory work in soils, foundation studies and design. Work would be in connection with construction of structures, highways and embankments. Applicant should be registered P.E. and be capable of assuming charge of the soils department. Excellent opportunity with long established engineering firm in Midwest. P-4115, Engineering News-Record.

GUNITE—ORGANIZE operation for established New York contractor. Must know estimating and take-off. Excellent opportunity for right man, who will have opportunity to become executive of aggressive and growing organization. Share of gunite profits in addition to attractive salary. P-4123, Engineering News-Record.

WANT STRUCTURAL detailer, experience required. Engineering background desirable. Eugene F. Wilsey Company,—Sioux City, Iowa.

SELLING OPPORTUNITIES OFFERED

SALES ENGINEERS — New York City and Rochester, New York territories open with well established national concern selling prefabricated metal products to engineering and construction markets. Positions are permanent and offer excellent future with aggressive progressive and expanding organization. Engineering degree desirable. Previous sales experience necessary. Ages 24 to 30. Car furnished. Complete training program. Salary and bonus. RW-3855, Engineering News-Record.

WANTED EXPERIENCED Construction Men with knowledge of rock drilling equipment to be trained as Sales Representatives and to work in the Eastern United States. Positions are permanent and offer excellent future with aggressive, progressive and expanding organization. Previous sales experience is necessary. Please give complete resume of experience, qualifications, salary requirements, and availability. RW-3957, Engineering News-Record.

EMPLOYMENT SERVICES

SALARIED PERSONNEL, $3,000-$25,000. This confidential service, established 1929, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. L, 241 Orange St., New Haven, Conn.

POSITIONS WANTED

CONST. ENGR.—20 yrs experience on all types of Construction—Airbases—Canals—Dams—Hospitals—Concrete Bldgs—Wood frame bldgs—office and field work—Masters Degree in Civil—Prefer foreign work—Just off a completed airbase contract—43 yrs old—Available stateside Nov. 5th. Write Box PW-3443, Engineering News-Record.

SALARIED POSITIONS $5,000 — $35,000

We offer the original personal employment service (established 44 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars.

R. W. BIXBY, Inc.
659 Brisbane Bldg. Buffalo 3, N. Y.

POSITIONS WANTED

OFFICE MANAGER familiar all phases construction contracting business. Many years experience large projects Branch Offices Latin America. Speaks, reads, writes Spanish. Available immediately. PW-3893, Engineering News-Record.

REGISTERED C.E. 25 years experience. Roads, bridges, sewers, public works, etc. Design, construction, administration, specification writing. Desires office position. PW-3986, Engineering News-Record.

CONSTRUCTION EXECUTIVE, long New York experience buildings and heavy construction, available for new connection as Project Manager on large operation or as Contractor's executive, where scope will permit full use of ability. Inquiries solicited from contractors requiring top man, qualified to handle all phases, bid to completion. New York area preferred. PW-3661, Engineering News-Record.

GENERAL SUPERINTENDENT—thirty years' experience, thorough knowledge all phases construction work consisting of building, airport, road, railroad, concrete, sewer and drainage, heavy excavation, dams, bulkheads, jetties, estimating, supervision and maintenance of construction equipment. Available now for either foreign or domestic work. References available. Box PW-3023, Engineering News-Record.

CONSTRUCTION ENGINEER experienced in erection industrial, chemical, oil and gas plants desires job. Not too particular about location. PW-4069, Engineering News-Record.

EXPERIENCED CONSTRUCTION Superintendent wants job. Location immaterial. PW-4070, Engineering News-Record.

SENIOR CIVIL Engineer wants contact; firm or civic, in small place, on sewers; drains; roads; water; refuse; taxes &c. Able & alert. PW-4088, Engineering News-Record.

CONSTRUCTION SALES Executive, 20 years experience New York commercial and industrial construction, available for new connection. C.E. Grad., Reg. Prof. Engr. Presently employed as sales manager by New York City firm of engineers and contractors. Inquiries solicited from engineering and construction firms requiring top man to increase sales volume. New York area preferred. PW-4046, Engineering News-Record.

CONSTRUCTION — FIELD Engineer. Registered, age 55. Broad experience design, layout, construction. Waterworks, sanitation, industrial, railroad, development and heavy construction. Available October for construction supervision for owners or engineers. No. straight design-estimating. Prefer East or South. PW-4047, Engineering News-Record.

EXECUTIVE THOROUGHLY experienced all phases construction industry, desires connection with progressive, growing builder. PW-4062, Engineering News-Record.

ESTIMATOR, CHIEF Engineer for heavy construction only. Executive, with broad experience in both field and office on all types of heavy construction, and with proven ability to supervise estimating and engineering departments, invites replies from progressive heavy construction contractors. After twenty years with well established company, desires change. PW-4092, Engineering News-Record.

(Continued on following page)

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Complete Building Estimators Course, also Building Labor Calculator for practicing estimators. Thirty-fourth year serving the building industry. For free trial and all particulars write:

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Engineers—Foremen—Office Men

Learn latest methods to organize and run work. Prepare for the top jobs.
Send post card for details.

GEO. E. DEATHERAGE & SON
CONSTRUCTION CONSULTANTS
411 So. 5th Ave. Lake Worth, Florida

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ARCHITECTURAL ENGINEERING

OUR COURSES of instruction by mail HAVE HELPED THOUSANDS to better positions and to pass State Board Examinations. ***Forty-fourth year. Write today.***

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SEARCHLIGHT SECTION

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POSITIONS WANTED

(Continued from opposite page)

GENERAL SUPERINTENDENT all forms grouting and subaqueous work, along with soil stabilization and structure restoration. Can assume full job responsibility. 15 years with present company but desire to make a change. Prefer a small fast-growing concern in southern or midwestern locality. No boozer, married. Nominal salary to start. PW-4096, Engineering News-Record.

ESTIMATOR—31, graduate civil engineer thoroughly familiar with all phases of take-off, pricing and sub-bids, for public and institutional work. Presently employed. PW-4090, Engineering News-Record.

SANITARY ENGINEER, age 57, in excellent health, available after December first. Registered P.E. in eight states. Thirty two years successful experience in all phases of water and sewage projects, including investigations, reports, design, construction and operation. Can work with and supervise men efficiently. PW-4091, Engineering News-Record.

ENGINEER, 31 BSCE 4 years field supervision experience, building and heavy construction. PW-3892, Engineering News-Record.

CIVIL ENGINEER P.E. Register in N. Y. Experienced construction, design, estimating, management. Seeks position with general contractor or consulting engineer. Prestressed concrete experience. Prefer location within 200 mile radius of New York. PW-4144, Engineering News-Record.

ADMINISTRATIVE ENGINEERING Position: Professionally established civil engineer with thirty years design, construction, and teaching experience, principally in bridges and structures; author of several books. Desire position with responsibility with consulting firm. Desire change for ethical reasons. PW-4129, Engineering News-Record.

SUPT.—ENG. Over 36 yrs experience in all phases of construction. Reasonable salary. Domestic or Foreign. Available Oct. PW-4114, Engineering News-Record.

CIVIL ENGINEER—28, BSCE. Registered PE-5 years structural design, over two years airfield construction and design. Desire position with consultant organization or contractor. PW-4131, Engineering News-Record.

ADMINISTRATIVE ENGINEER, P.E., Multi state registration. Water supply hydro electric, industrial plants. Structural, hydraulic, mechanical problems. Consulting and industrial experience. Salary over $10,000. Immediate availability. PW-4156, Engineering News-Record.

ENGINEER SUPERINTENDENT, Young graduate C.E. Registered P.E. 7 years experience in heavy construction, currently employed by a small utilities contractor, desires a position with a larger concern. PW-4145, Engineering News-Record.

B.C.E., 30, varied experience, preferably Westchester or lower Connecticut. PW-4164, Engineering News-Record.

CONSTRUCTION SUPERINTENDENT. Experienced and capable of taking full responsibility of schools, hospitals, factories, sewage disposals and highway bridges. Live in house trailer, will travel. Available immediately. PW-4163, Engineering News-Record.

CONSTRUCTION ESTIMATOR—Office Engineer. Graduate. 14 years experience. Can handle job from bid to completion. Excellent record. L. Z. Stotts, 531 E. Front St. Statesville, N. C.

PRIVATE SERVICE ONLY
ESTIMATING TEAMS

Complete take-off with our cost system. Final recap sheet with master trades and subcontracts. One-half million to five million jobs.
New Jersey Area preferred. Other locations well considered.
Also special rates for yearly work based on minimum jobs.

WW-4077, Engineering News-Record
330 W. 42 St. New York 36, N. Y.

WANTED TO SUBLET

Excavation and Hauling of 200,000 cubic yards of shale on the Ohio Turnpike.

Call
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New Book
ESTIMATING PRODUCTION AND CONSTRUCTION COSTS
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Estimate general construction costs any time, place —quicker, more accurate. $15 postpaid from:
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POSITIONS WANTED

DESIRE RESPONSIBILITY of supervision on heavy construction. Experienced in all phases on dams, floodwalls, highways and airdromes. Still young. Reply PW-4174, Engineering News-Record.

AVAILABLE: GRADUATE Construction Engineer; 15 years, commercial bldgs, power plants, sewer & water construction. Field or office. PW-4176, Engineering News-Record.

BUSINESS OPPORTUNITIES

Wanted to buy: Engineering corporation licensed to do business in New York State, BO-4132, Engineering News-Record.

Attention: Architects—engineers—and contractors. Engineering materials testing laboratory engaged approximately thirty years on major construction projects from East Coast to West Coast is interested in contacting engineering and construction companies working on large scale Domestic or Foreign projects, for the purpose of furnishing specialized engineering services. Would be interested in negotiated contracts or on a joint venture basis. Large staff of highly trained engineers, excellent references and strong financial position. BO-4162, Engineering News-Record.

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For Immediate Use on Large Project

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P. O. Box 263 ASHEVILLE, N. C.

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4000′ 15 or 16″
CONCRETE FORMS
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Box 145 Baltimore 20, Md.

WANTED
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1136	Fairbanks Morse	38D	1600	720	350	Baldwin	VO-6	510	450
1100	General Motors	16-278A	1600	720	320	Enterprise	DSG-6	560	450
1000	General Motors	16-567B	1440	720	300	General Motors	8-268A	450	1200
750	General Motors	12-567	1080	720	200	General Motors	8-268A	350	900
700	Worthington	EE-8	1000	327	150	Worthington	CC-4	225	450
500	General Motors	8-278A	750	720	150	Ingersoll-Rand	8-4	225	600
500	General Motors	8-567	720	720	150	Buckeye	80	240	600
500	Alco	6-12½x13T	750	600	100	General Motors	3-268A	150	1200
400	Sterling	VDS-8	600	1200	60	General Motors	6-71	90	1200

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DIESEL DIVISION, 50 CHURCH ST., NEW YORK 7, N. Y.

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10 ton Unit No. 1020 Pneu Tired Crane.
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1200 CFM Ing. Rand XRE, 200 HP Air Compr.
130 HP American 3D Hoist & Swinger.
60 ton Clyde 28E Elec. Gantry Crane.

MISSISSIPPI VALLEY EQUIPMENT CO.
509 Locust St. St. Louis 1, Mo.

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1—Bay City Model 65 Crawler Shovel 1¼ yd. Cummins diesel. Crane Boom & hoe available. Reconditioned.
1—Osgood 1 yd. Crawler Hoe & Crane, 50′ boom. Gas Power. Good Condition.
1—Bay City Model 42, ¾ yd. Crawler Hoe-Shovel-Crane. Thoroughly reconditioned. Gas Power Cat. Diesel.
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1—P & H Model 255 A Crawler Hoe or Shovel, ¾ yd. Cat Diesel. Late Model in excellent condiiton.
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1—Bay City Model 25, ½ yd. Crawler mounted hoe or shovel, gas power. Completely rebuilt.
1—Koehring Model 205, ½ yd. Crawler Hoe. Gas Power. Late model fully rebuilt.
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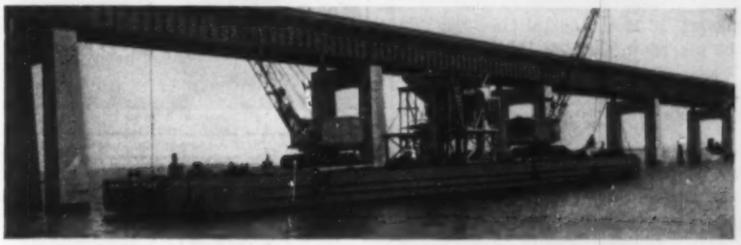

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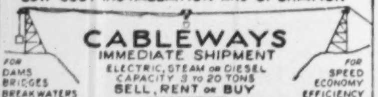

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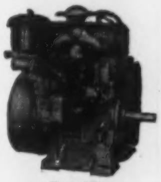
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A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SERIES

RESULTS OF AN INTELLECTUAL REVOLUTION . . .

"The Western Miracle" Continues... More Automatic Controls for Industry

Within recent weeks three new monthly technical magazines devoted to automatic control systems for industrial processes and machinery have offered the public their first issues. One of these is CONTROL ENGINEERING, a McGraw-Hill publication.

What has caused this surge of interest in the design and application of automatic control systems? What does it portend for the future of American industry? More important, what does it promise for the American standard of living, of which industry is and must be the servant? And what is the role of CONTROL ENGINEERING in this development? It is to those questions that this statement is addressed.

A New Intellectual Revolution

It is frequently asserted that we are now in the throes of a new industrial revolution. The revolution is described as the eliminating of wasteful applications of human labor to repetitive tasks through new technology which makes it possible to transfer those tasks to automatically controlled machinery.

It is perhaps more accurate, however, to say that we are the beneficiaries of a new intellectual revolution in the application of science to industry. This new intellectual revolution points the way toward giant strides in the continuing process of taking dull and laborious work off the backs and minds of men and transferring it to machines operating in large batteries under automatic control.

The practical engineering work required to convert this intellectual revolution into a full-scale industrial revolution, however, in large part still remains to be done. It is to this task that CONTROL ENGINEERING will be devoted. Its role is that of bridging the gap, in engineering and economic terms, between the new conceptions of automatic control of industrial processes and their practical workaday application. These conceptions run the full gamut from systems of control for automatic factories making heavy industrial products to highly personalized systems of automatic control to warn people when they are approaching the broiling point in sunning themselves at the beach or becoming too drowsy to drive their cars safely.

Enter the "Feed-Back" System

Enough work has been done to move these conceptions out of the realm of interesting dreams and into the realm of practical possibilities, and in some cases into the realm of practical realities. Crucial parts of this work were done during World War II when weapons were successfully equipped with "feed-back" systems that automatically corrected mistakes made by the weapons in locating their targets.

The principle of the "feed-back" system is as ancient as the personal monitor that tells us not to run into each other as we walk along the street. It feeds back to our locomotion machinery the warning of a collision ahead. But the application of the principle to weapon control and then to more general machinery control required superlatively imaginative and skillful scientific development.

When a "feed-back" system that monitors an automatic process and keeps it lined up precisely is teamed up with a computing machine, capable of making lightning calculations that control both what goes into the process and what is done with the product, the horizons of automatic control become broad indeed. But in large part they still remain horizons. A vast range of practical engineering work remains to be done to realize anything like the full potential of automatic control of industrial processes and machinery.

More and Better Jobs

There are those who view the surge of interest in automatic control with alarm. They conjure up a situation in which automatic processes will at once expand the ranks of the unemployed and reduce many of those still working in industry to the status of robots or automatons.

A look at the record of the American economy — a record of amazing growth, steadily improving job opportunities and a constantly rising standard of living — demolishes the basis for such fears. The introduction of new and more efficient industrial machinery and processes obviously cannot be accomplished without creating some disturbance for some individuals and some companies. But consistently the longer range effect of such local and temporary disturbance has been more jobs and better jobs for Americans.

It is no accident that, while the proportion of industrial wage earners in our population is virtually the same as it was in 1920, the proportion of professional and salaried workers has doubled. The proportion of unskilled workers, furthermore, has dropped by half. This has been an essential part of a continuing process by which drudgery has been transferred to machines while the workers who formerly did the drudgery have been graduated to jobs calling for greater competence and providing better pay.

Higher Living Standard

A British historian, H. J. Hancock, has referred to this general process as "the Western miracle"—that of providing an ever higher and higher standard of living for more and more Americans. The key element in this miracle has been more and more reliance on power-driven machines to get the day's work done.

In the nature of the extremely complicated apparatus involved, full development of systems which have passed through the "think stage" into the status of practical possibilities will be a time-consuming process. It will also be a very exacting process, calling for a tremendous application of engineering skill and ingenuity. However, the engineers who are concentrating on this difficult, workaday phase of the development of apparatus for automatic control will be inspired by the knowledge that they are making a crucial contribution to technical progress which holds great promise of good for the American people.

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